News about

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EXCEPTIONAL ABRASION RESISTANCE of new Hycar 1072 was first proved in laboratory test shown in this photo, then confirmed by field evaluation.

Gives outstanding abrasion resistance

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FINISHED parts made with Hycar 1072 have from four to ten times the abrasion resistance of parts made with typical nitrile rubbers. Gum tensile strength is unusually high. Ozone resistance is exceptional.

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For further information on properties of Hycar 1072, write Dept. KA-4, B.F.Goodrich Chemical Company, 3135 Euclid Avenue, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

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Rubber Age

COVERING THE MANUFACTURE OF RUBBER AND RUBBERLIKE PLASTICS PRODUCTS

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Highlights Sidelights *of the News . . .*

April, 1958

According to a recent survey, nine of the eleven major tire producing firms in the United States showed gains in 1957 sales, while the remaining two companies missed by only small margins . . . Six of the companies showed profit increases even in the face of the slump which developed in the closing months of the year . . . For seven of the companies, sales hit an all-time high (page 115).

A Soviet trade mission has announced that Russia has placed an order in Great Britain for tire factory equipment amounting to $28 to $42 million . . . The equipment will be utilized in the construction of a factory to be built at Dniepropetrovsk in the Ukraine . . . It is believed that this will be the largest tire plant outside the United States with a productive capacity of 2 million tires a year (page 145).

DuPont has announced that its new facility for the production of "Viton" is now nearing completion at Deepwater Point, N. J. . . . Described as a linear copolymer of vinylidene fluoride and hexafluoropropylene containing about 65 per cent fluorine by weight, the new rubber joins an ever-growing group of synthetics available to industry (page 118).

A recent meeting of the Association of Rubber Manufacturers in India revealed that attempts are being made to establish manufacturing plants for antioxidants, carbon black and synthetic rubber in India . . . It was reported at the meeting that Indian consumption of rubber in 1957 set a new record for the country (page 119).

Additional details on DuPont's LCM process for the continuous vulcanization of neoprene extrusions have now been made available . . . It is emphasized that the use of the new system provides for many advantages. including lower production costs . . . It is stressed that a relatively small floor area is required for the operation (page 125). A feature article on this subject appears on page 88.

Sun Rubber Co. reports infringement of its copyright and trademark rights by foreign manufacturers of toys and dolls . . . Sun has cautioned dealers and distributors that it will take legal steps to protect its rights (page 149).

Goodyear predicts the consumption of 1,635,000 long tons of rubber by the U.S. in 1960 in its annual financial report . . . Goodyear notes that since the introduction of synthetic rubber some twenty years ago. the use of new rubber per year in this country has grown by 151 per cent (page 118).

HUBER LABORATORIES

Borger Laboratories *are equipped with science's latest tools for rubber research.*

Carbon black *research also takes place in this Borger pilot plant.*

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In addition to the broad areas of carbon black improvement and utilization, our Development Department is constantly occupied with solving specific compounding problems. The continued use of our facilities attests to the high standards of the laboratories and the Technical Reports and Data Sheets they publish.

The full facilities of our Research Department are available through your nearest Huber representative. He is a trained rubber technologist and will see that your compounding problems are sent to proper channels at our Borger, Texas headquarters.

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DAY

DUST CONTROL NEWS

Two DAY "AC" Dust Filters (left and center of photo) and DAY bag trap (at right) located on roof of rubber company plant. Empty carbon black bags are carried from work area to bag trap through same piping system used to control dust in work area. This eliminates bag disposal problems, speeds production.

Capture and Restore Carbon Black Dust Losses Automatically

DAY "AC"* Reverse Jet dust filters are favorites with rubber companies because they effectively control dust from Banbury mixers and return captured dust to the *same* mixture from which it escaped. This rapid return of dust means better control of weighed ingredients. It also eliminates adding extra materials to take care of "invisible" dust losses. This automatic and continuous return of ingredients improves mixture uniformity and batch quality.

The majority of DAY filters are installed *inside* rubber company plants. DAY filters are so highly efficient the clean air from the filter can be returned back to work areas. During the winter time this saves considerable heat loss. In summer the air from the filter can be exhausted outdoors to help keep the plant cooler. DAY dust control improves product quality and helps increase production for rubber companies. It is your best dust control buy. **For the latest information about DAY services and "AC" dust filters write toDAY for your copy of Bulletin F-75.**

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Letters to the editor

Sporting Note

Dear Sir:

Did you know that the world hockey championship was virtually won by the rubber industry? Of course, I refer to the recent successes in Norway by the Canadian team, the "Whitby Dunlops," which is sponsored by our company in Whitby.

The team has had an almost Cinderella-like history, being in existence only a few years and rising from championship to championship and finally defeating Russia 4-2 for the world's hockey championship on March 9th.

N. S. GRACE

Dunlop Research Centre
Toronto 8, Canada

Welcome Addition

Dear Sir:

Editorials on business, management, and relative subjects are a welcomed addition to the technical articles appearing in your excellent magazine and . . . add considerably to rounding out the information which it serves the rubber industry.

J. W. ROWLAND, JR.

Victor Balata & Textile Belting Co.
Easton, Penna.

Research Program

Dear Sir:

With reference to the editorial on rubber research which appeared in the February, 1958, issue of your journal: This idea of a centralized basic research organization for the rubber industry is a good one, but if past performance is any guide, we will hear much about the plan but little will come of it. That the rubber industry needs such an organization there is little doubt. Most European countries have such groups and in many cases they are supported in whole or in part by the government.

It seems to me that the rubber industry in this country should be able to come up with some kind of a plan providing for a basic research unit without governmental assistance. I notice that the natural rubber producers are readying plans for a technical service organization in this country and this is a step in the right direction. If the rubber industry means to maintain a position of technical superiority, it had better get behind this basic research organization plan now.

READER

Symposium Coverage

Dear Sir:

Your comprehensive report on the Ozone Symposium renewed many pleasant memories of the meeting, and I think that you have done a fine job.

A. J. HAAGEN-SMIT

California Institute of Technology
Pasadena, Calif.

"cracked already and it hasn't even rolled yet!"

Ozone damage to an unused tire can make an Ambassador of Ill Will for your brand.

UOP 88 & 288 prevent ozone damage for the life of the tire

This man has just become somebody's *ex*-tire-customer. And no wonder. Ozone cracks are not only unsightly but they materially reduce the strength and durability of the tire.

Obviously, this tire manufacturer failed to give his product the kind of built-in *chemical* protection that UOP 88 and 288 insure. Pre-mold addition of UOP 88 and 288 mean absolute protection against ozone damage and weather checking.

Are your tires getting this kind of protection? Better let us send you samples of UOP 88 and UOP 288 for testing in your own laboratories. Or, if you prefer, we'll be very glad to help you work out the correct antiozonant formulation for your product. Write our Products Department.

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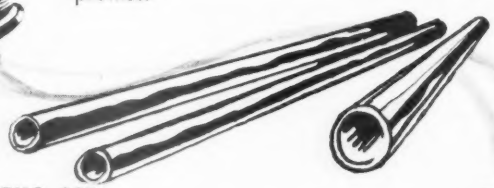
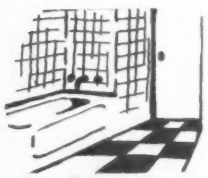


BLACAR PVC 225 —

Intermediate molecular weight resin with excellent heat stability features, good blending characteristics, low gel count, uniform particle size, and exceptional clarity and color. Recommended for improved surfaces such as in tubing and transparent garden hose.



BLACAR PVC 250 —

High molecular weight general purpose resin — especially recommended for dry blend extrusion operations because of its exceptional free-flowing characteristics, excellent heat stability and electrical properties. Uniform particle size and low "fish eye" count ensures superior extruded surfaces and clearer transparent products.

For Calendering: BLACAR PVC 200-225-250 — Low, Intermediate and High Molecular Weight Resins — each with its own specific advantages and features — to help produce the highest quality vinyl sheeting and film.

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Write for complete details on these or other special resins or compounds — or for technical assistance.

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- High Melting Point Synthetic Waxes

Canadian Representative: Lewis Specialties, Ltd., 18 Westminster North, Montreal 28, Que.

Re: Rubber Red Book

Comments on the 1957-58 edition of the RUBBER RED BOOK *continue. The letters which follow are only some of the many sent along by our readers.*

. . . We find this excellent volume of considerable interest for reference purposes.

SECRETARY
Association of Rubber Manufacturers of India
Calcutta, India

. . . Again you have produced a superb directory and general reference pertaining to the rubber and allied industries. Don't know how I could operate without it.

S. E. OVERLEY
Dept. of Commerce
Washington, D. C.

. . . It is a fine book and we put it to use the very day it arrived. We know we now have a fine and reliable source of reference which will be used frequently.

S. C. COMPHER
Dept. of Commerce
Washington, D. C.

. . . The growth of the rubber industry is not only reflected in the increased size of your publication, but that 185 more rubber companies and almost twice that number of plants are listed in the current issue as compared with the 1955-56 volume.

H. C. JONES
New Jersey Zinc Co. (of Pa.)
Palmerton, Penna.

. . . It is certainly an excellent resource for myself as well as other members of our compounding development organization.

L. R. KELTNER
B. F. Goodrich Tire Co.
Akron, Ohio

. . . We feel sure the issue will be referred to quite regularly throughout the next couple of years.

E. J. MINCH
Sheller Mfg. Corp.
Portland, Ind.

WRITE IT DOWN

The letters to the editor columns of RUBBER AGE are open to all our readers and we invite your comments on matters pertinent to the rubber industry or on RUBBER AGE itself. Before you forget it, write it down and send it to:

Editor
RUBBER AGE
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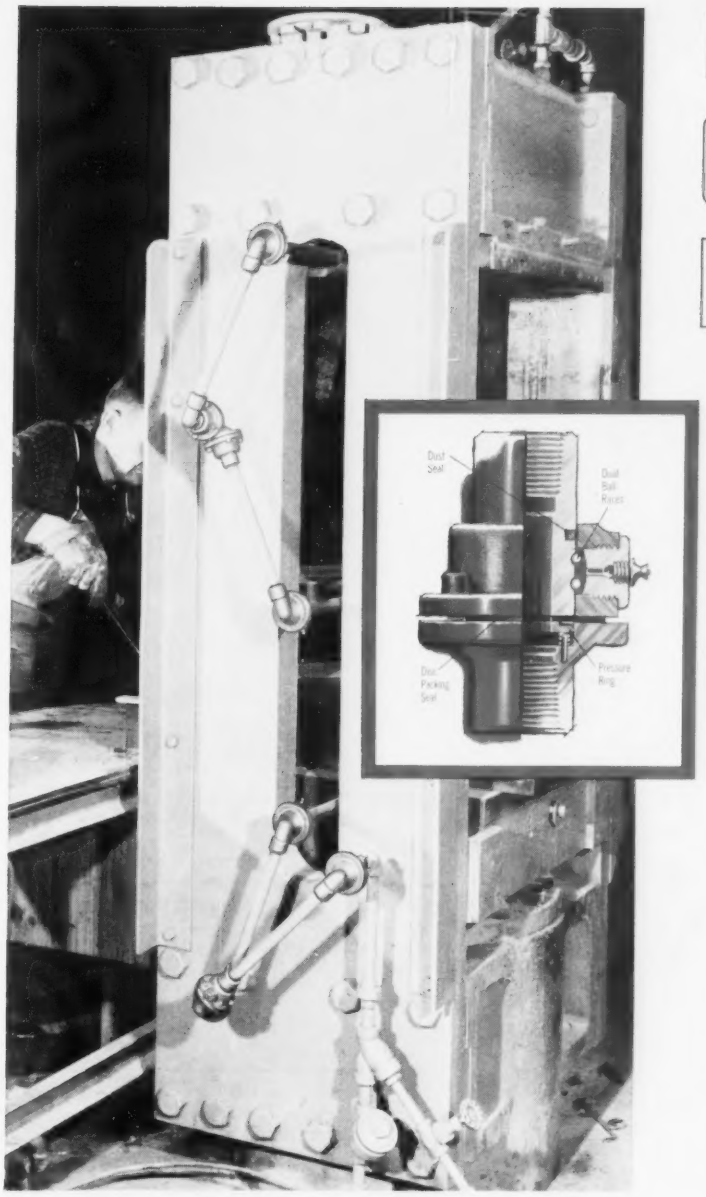
New York 1, N. Y.



Typical of its diverse applications, the Discpak Swivel Joints, installed on the steam lines of the above platen press, provide predetermined travel arc, allow for packing replacement without removal from the line.

Chiksan Discpak Swivel Joints eliminate hose replacement costs, provide controlled line flexibility and end hose rupture hazards. A low cost seal is easily inserted *without* removing joint from the line. Savings in downtime and replacement costs quickly repay cost of installation. Don't delay, send for literature and name of your nearest Chiksan field engineer today.

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INSURE SAFE, LASTING FLEXIBILITY FOR HOT GAS AND STEAM SERVICE LINES...

Replace packing with joint in the line—

Keeps line flexing in predetermined arc—

Free swiveling with extremely low torque—

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Unlimited service life with minimum maintenance—

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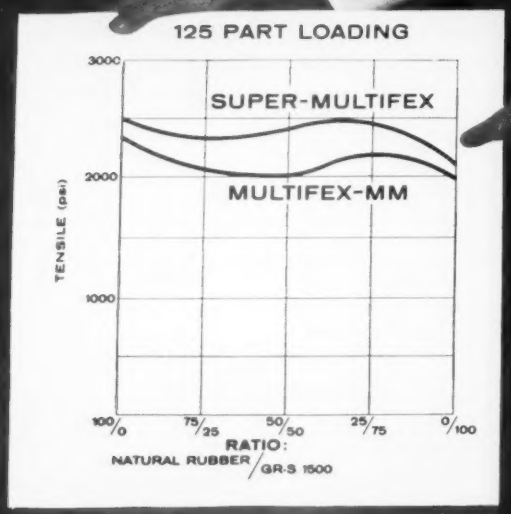

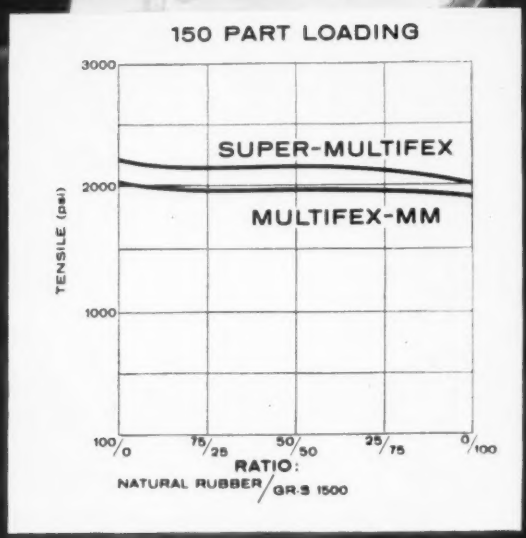

Now you can use DIAMOND Super-Multifex in your GR-S compounds—even in those with *no* natural rubber—and be sure you're getting at least 2000 psi tensile strength.

Contrast the performance of Super-Multifex and Multifex-MM® with the much lower tensiles normally obtained in compounds containing ground limestone.

DIAMOND's ultra-fine Super-Multifex (.03 micron) precipitated calcium carbonate has extremely uniform particles, coated to aid dispersion, mixing and processing.

Multifex-MM, also shown on the graphs, is an uncoated, ultra-fine (.04-.06 micron) precipitated calcium carbonate. You can see how it consistently reinforces GR-S, too.

Try either Super-Multifex or Multifex-MM in your next batch to improve physical properties. Call your DIAMOND Representative today. He can supply information and technical help on these and other high-grade calcium carbonates. Or write DIAMOND ALKALI COMPANY, 300 Union Commerce Bldg., Cleveland 14, Ohio.

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- Caster Cups
- Basin Stoppers
- Force Cups
- Door Bumpers

And those hundreds of "Every day in use" rubber household items every homemaker wants.

Marbon "8000-A" is the superior-processing resin which fluxes rapidly at lower temperatures (165-175 degrees F.). For improved dispersion, shorter mixing cycles, cleaner brighter colors and faster heat-plasticizing action with lowered power demand, you can't beat this outstanding high styrene resin. Contains all of the reinforcing properties of Marbon 8000 — Gloss — Durability — Dimensional Stability.

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GARY, INDIANA

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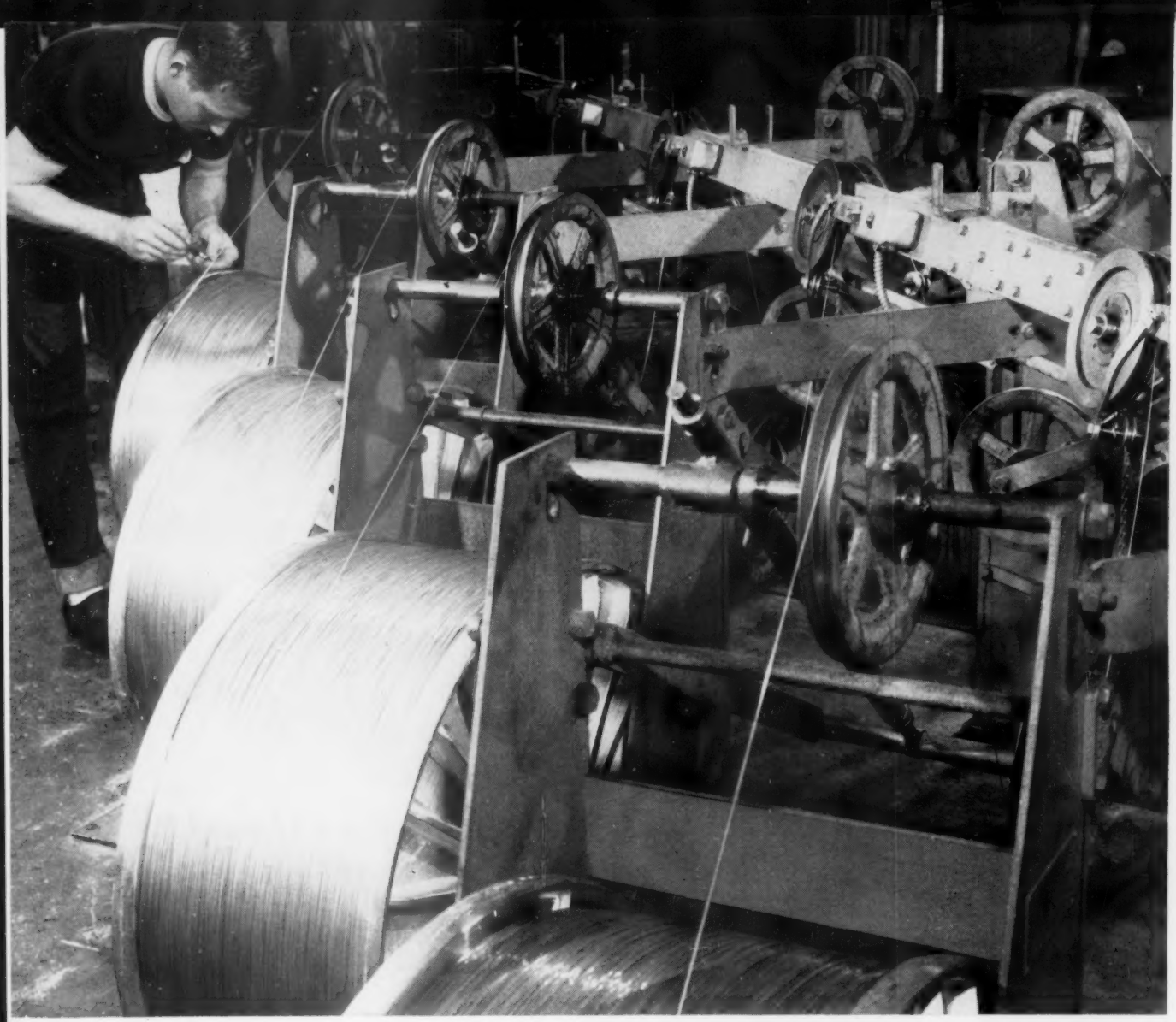


Let-off equipment at Gates Rubber is where Johnson Steel & Wire Company's tire bead wire proves out. Johnson's 1,000-pound coils give far longer runs than the former coils of 400 to 600 pounds. And Johnson's uniform quality and packaging techniques insure trouble-free operation.

Gates Cuts Tare Weights by 7½ Times With Johnson's New Bead Wire Spool

A unique history of success—founded on an unusual business philosophy—has been written during 47 years of business by The Gates Rubber Company of Denver.

From its beginning as a small leather shop in 1911, employing a single person, until the present when it is exceeded in size by only five other rubber manufacturers among 1,400 in the industry, Gates has restricted its production to what it calls "necessary accessories to an essential product."

Following this policy, Gates today is a leading supplier of industrial rubber products, one of the largest producers of hose, the world's largest manufacturer of V-Belts, as well as a growing producer of tread rubber and top quality truck and passenger car tires.

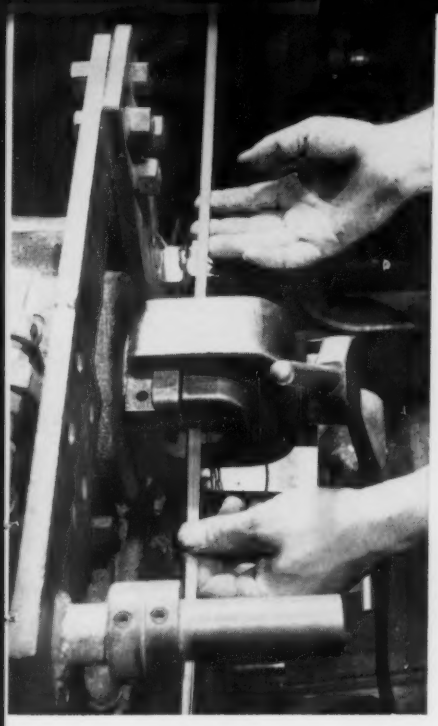
In tire manufacturing, as in its production of other products, Gates follows this three-fold quality "code."

1. Get the latest, most efficient tire-making equipment and operate it in a clean, modern plant.
2. Insist on finest raw materials.
3. Establish rigid specifications—test to make sure specs are met—inspect products in process frequently to be certain of desired final quality.

It's on points 2 and 3 that Johnson Steel & Wire Company, Inc., comes into the Gates picture.

Johnson's tire bead wire meets all requirements of Gates' four major specifications: uniformity of tensile, gage, plating as well as cast.

Then—in meeting Gates' fifth specification (for packaging), Johnson goes a step further and ships its tire bead wire on the finest new spool-less core available in the bead wire industry.



Here the actual beads are formed. Thick, uniform bronze coatings on tire bead wire, plus required composition, result in perfectly formed, evenly spaced beads that are tightly adhesive.

Where tires get muscles. Tire beads, each made of miles of Johnson Steel's tire bead wire, are shown here ready for delivery to the tire builder.

On Bag-o-matic machines like these, tires are shaped and cured. The Gates' battery of Bag-o-matics is one of the industry's largest and most modern.

In transit, the protection Johnson's new spool-less core gives bead wire is important, but equally so is another factor—savings in freight costs.

Gates is extra sensitive to shipping costs. By drastically reducing tare weight on reels of wire being shipped to Gates, and by fully eliminating return of empty reels, Johnson cuts tare weight to two pounds per hundredweight.

Easily palletized for quick fork-truck handling, Johnson's bead wire on spool-less cores represents 7 to 7½ times less tare weight than old-style reels. Since there's no return of the flangeless cardboard cores, this expense is out entirely.

Once in the Gates plant, spool-less cores require less storage space. There is nearly 1,000 pounds of wire per coil.

The clean, unbroken surface of Johnson's tire bead wire, the required composition of the bronze plating on the correctly tensiled wire all mean that the miles of wire in a Gates bead will do the job it's designed for: giving strength equal to the overall quality of the tire.

The same assurance of quality wire and the latest in packaging technology that Gates gets are available from Johnson Steel no matter what your specialty wire needs.

Whether it's wire for brushes, aircraft, bobby pins, high-strength springs, textile cards, reinforced rubber hoses or tires—you can depend on Johnson. Call any of the sales offices listed here.

Johnson Steel & Wire Company, Inc.

Worcester 1, Massachusetts

a subsidiary of **Pittsburgh Steel Company**

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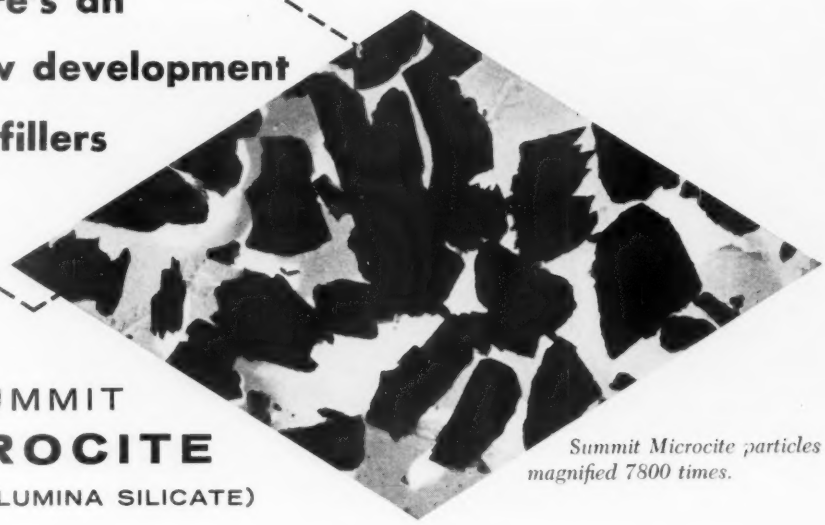

Summit Microcite particles magnified 7800 times.

SUMMIT MICROCITE
(HYDROUS ALUMINA SILICATE)

Here is Summit's revolutionary answer to an industry need . . . a top quality *micronized* filler material that will meet and outperform currently available products. Produced and tested under rigid quality control methods and *job-proved* in the field, Summit MICROCITE is ready to go to work for you . . . now!

By origin, Summit MICROCITE is a hydrous alumina silica, double air classified and processed to a *controlled* low particle size and high surface area. It is chemically inert and essentially neutral with a pH of 6.8. MICROCITE is free flowing . . . will not absorb moisture either in transit or in storage (moisture-controlled to ½ of 1%).

Here are some of the many reasons why it is best for you: *very low* mill shrinkage, not conducive to heat build up, good cured properties, high tensile strength, less die swell . . . mixes fast and easily . . . and is not scorchy.

Like to know *more* about how Summit MICROCITE can make *your* product better? Write today for a copy of Bulletin 1257 and Technical Data Sheets 100-1-2-3. There's no obligation, of course.

Summit MICROCITE is represented by:

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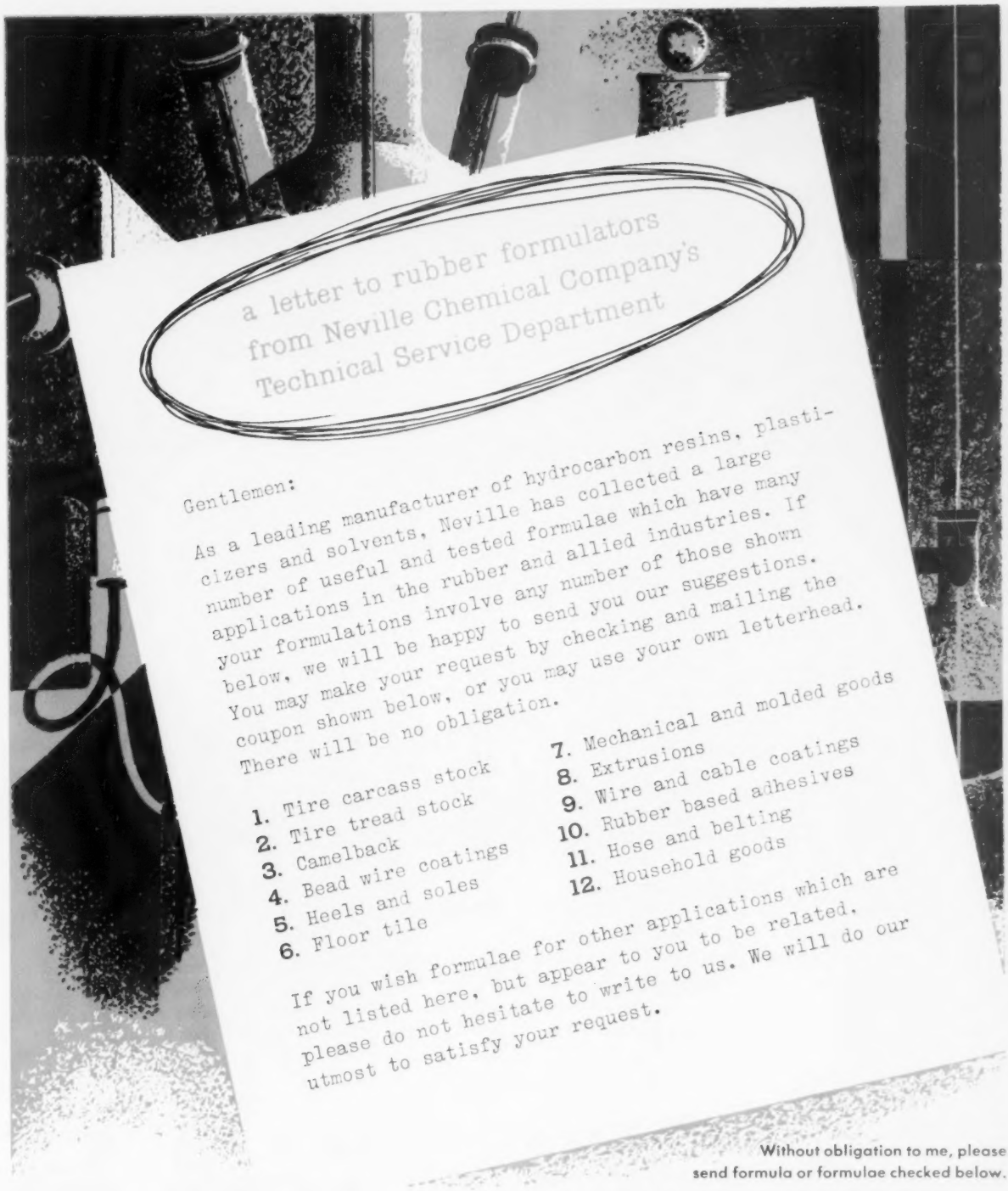
The B. E. Dougherty Co.
1807 E. Olympic Blvd.
Los Angeles 21, Calif.
Phone: MIchigan 9511
605 E. 3rd St., San Francisco 7, Calif.

SUMMIT MINING CORPORATION CARLISLE, PENNSYLVANIA

THE SUMMIT OF QUALITY


a letter to rubber formulators
from Neville Chemical Company's
Technical Service Department
Gentlemen:
As a leading manufacturer of hydrocarbon resins, plasticizers and solvents, Neville has collected a large number of useful and tested formulae which have many applications in the rubber and allied industries. If your formulations involve any number of those shown below, we will be happy to send you our suggestions. You may make your request by checking and mailing the coupon shown below, or you may use your own letterhead. There will be no obligation.
1. Tire carcass stock
2. Tire tread stock
3. Camelback
4. Bead wire coatings
5. Heels and soles
6. Floor tile
7. Mechanical and molded goods
8. Extrusions
9. Wire and cable coatings
10. Rubber based adhesives
11. Hose and belting
12. Household goods
If you wish formulae for other applications which are not listed here, but appear to you to be related, please do not hesitate to write to us. We will do our utmost to satisfy your request.

Without obligation to me, please send formula or formulae checked below.

Neville Chemical Company · Pittsburgh 25, Pa.

1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12.

Please send necessary sample or samples of Neville products necessary for experimentation.

Name _____ Title _____

Company _____

Address _____

NC 34 RA

NEVILLE

The start of the yarn may decide the outcome of your product

Yarn construction is a major factor in the "engineering" of base fabrics!

The construction of the yarn from which a base fabric will be woven pre-determines a number of fabric characteristics. Breaking strength, flexibility, bulking, absorption, and adhesion to other materials are affected by such things as type of fiber, yarn size and weight, twist, plies, and many other factors.

Obviously, engineering proper yarn construction calls for specialized experience, if every detail is to be considered thoroughly, in the light of the base fabric's ultimate assignment. At Wellington Sears, we've had over a century of experience in doing just that. Which is why you can have greater assurance that the base fabric you finally use is completely engineered for *your* job. For informative booklet, "Fabrics Plus," write Dept. G-4.

WELLINGTON SEARS

FIRST In Fabrics For Industry

For Mechanical Goods, Coated Materials, Tires, Footwear ... Other Rubber Products

WEST POINT MANUFACTURING CO.

WELLINGTON SEARS CO., 65 Worth St., N. Y. • Atlanta • Boston
Chicago • Dallas • Detroit • Los Angeles • Philadelphia • San Francisco • St. Louis

Photo courtesy Cameron Iron Works, Inc., Houston, Texas, and Linear, Inc., Philadelphia, Pa.—Manufacturers of Precision Molded Seals

How to make 4 lbs. of rubber pack a 1000-ton load

To batter a billet into rough shape, prior to machining, is no chore for the hydraulic forging press shown above. A press of a button and it works down the hot steel with a thousand tons of pressure every several seconds.

But it was a chore to find an adequate seal for the big press ram. Its designers looked long and hard before they found a split ring packing that would not leak under the high pressure and fast traverse.

Twin secret of the success of the fabric-reinforced, precision-molded, rubber rings now used are their unique design—and CHEMIGUM. A series of internal, V-shaped dams and external abutments seal off any labyrinth leakage, while the CHEMIGUM assures a lastingly tight fit.

The reasons why the ring manufacturer uses CHEMIGUM for this and other precision seals are its excellent resistance to oil, heat and abrasion and its unusual ease of processing. How can this outstanding combination of properties benefit your product? For details, write to Goodyear, Chemical Division, Dept. P-9419, Akron 16, Ohio.

CHEMICAL
GOODYEAR
DIVISION

RUBBER &
RUBBER CHEMICALS
DEPARTMENT

Chemigum, Plioflex, Pliolite, Pliovic—T. M.'s The Goodyear Tire & Rubber Company, Akron, Ohio

CHEMIGUM • PLIOFLEX • PLIOLITE • PLIOVIC • WING-CHEMICALS

High Polymer Resins, Rubbers, Latices and Related Chemicals for the Process Industries

Photo courtesy Exide Industrial Division, Electric Storage Battery Co., Philadelphia, Pa.

Want a battery of compliments?

If you're looking for a product that will win compliments everywhere, why not take a lesson from the manufacturer of the big batteries shown above. For he has learned through experience, that some jobs are just made to order for PLIOFLEX rubber.

His particular problem lay in finding the right material for the battery cases. Conventional container materials just didn't have the strength or resilience to withstand the shock, pressure and abuse of rugged Diesel locomotive service. His answer was to pioneer the use of fully molded, hard rubber cases and covers.

At first, natural rubber was used. But then his case supplier suggested changing to PLIOFLEX. The reasons? PLIOFLEX is considerably more uniform, accepts a wider variety of fillers for easier compounding, processes more readily and cures faster. The end result: A better battery case at lower cost.

How can PLIOFLEX improve your product? Why not find out by writing, today, for full details and the finest in technical assistance. Address:

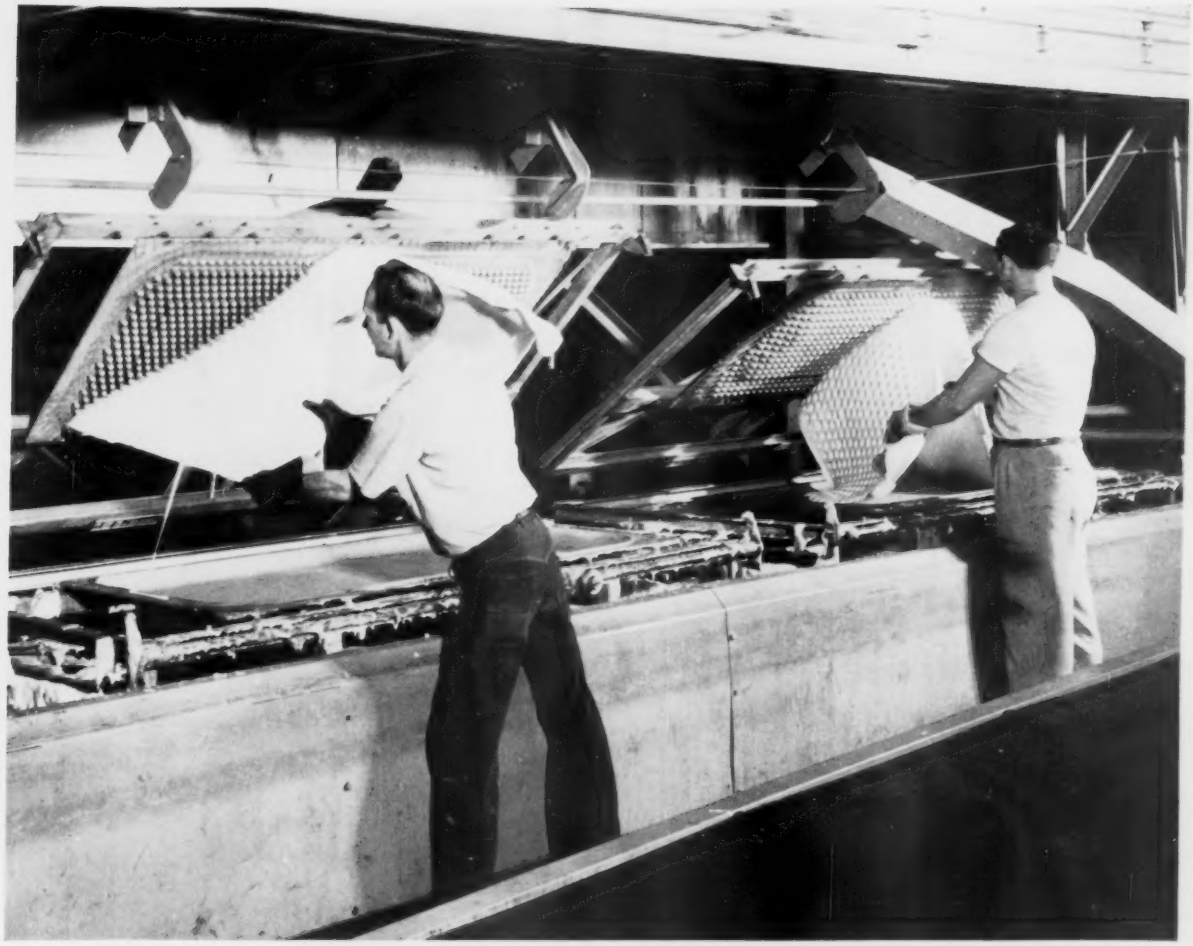
Goodyear, Chemical Division
Dept. P-9419, Akron 16, Ohio

GOODYEAR

CHEMICAL DIVISION

CHEMIGUM • PLIOFLEX • PLIOLITE • PLIOVIC • WING-CHEMICALS

Chemigum, Plioflex, Pliolite, Pliovic—T. M.'s The Goodyear Tire & Rubber Company, Akron, Ohio



What's first and foremost for foam?

First and foremost choice of a number of manufacturers of foamed rubber products is one of two Goodyear latices—PLIOLITE LATEX 2104 or PLIOLITE LATEX 2105.

PLIOLITE LATEX 2104 is a "cold" polybutadiene latex which exhibits virtually no odor. This feature plus its high solids content and excellent mechanical stability make PLIOLITE LATEX 2104 extremely well-suited to the production of pillows, mattresses and other types of cushioning.

PLIOLITE LATEX 2105 is a "cold," high solids, butadiene/styrene latex. It, too, exhibits excellent mechanical stability with light color, high physical properties and low temperature flexibility—for advantageous use in foamed goods where very slight odor is permissible.

In addition to these latices, there are a number of other rubber and resin latices in the PLIOLITE family. Each can be used alone or in combination with the others to obtain specific properties in foam or any of the many applications for latex.

Details plus the latest *Tech Book Bulletins* on PLIOLITE LATEX are yours by writing to:

Goodyear, Chemical Division, Akron 16, Ohio

CHEMICAL
GOODYEAR
DIVISION

Chemigum, Plioflex, Pliolite, Plio-Tuf, Pliovic—T. M.'s The Goodyear Tire & Rubber Company, Akron, Ohio

COATINGS DEPARTMENT

CHEMIGUM • PLIOFLEX • PLIOLITE • PLIO-TUF • PLIOVIC • WING-CHEMICALS

High Polymer Resins, Rubbers, Latices and Related Chemicals for the Process Industries

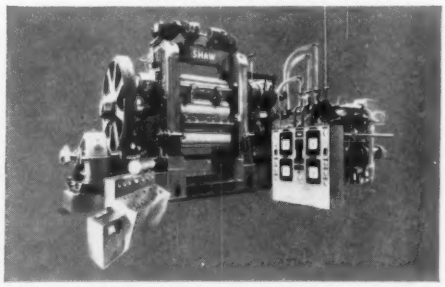
FRANCIS SHAW

quality engineering puts efficiency into Shaw machines

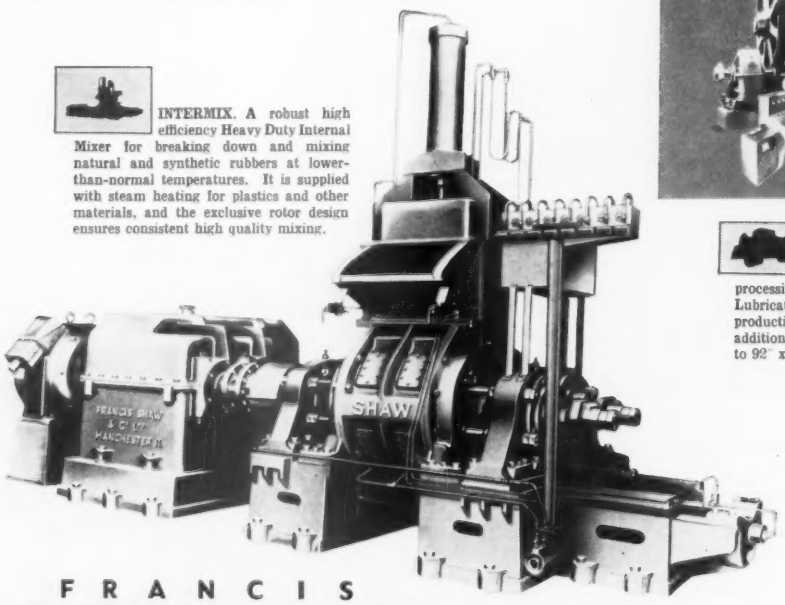
The cost-cutting performance of every Francis Shaw machine and its thorough dependability are the result of long experience and unvaryingly high standards of engineering in every detail of manufacture.
Close-limit accuracy and rigorous inspection during manufacture guarantee to the user a consistently high quality output from Francis Shaw equipment.

TWO-ROLL MIXING MILL
For the efficient mixing and warming of all thermoplastic-thermosetting materials Shaw produce a range of mills from 13" x 16" up to 84" x 26". Supplied in batteries or with individual drives, these machines are capable of high sustained output. Single or double geared models available. The machine shown is fitted with Lunn Safety Gear.

Francis Shaw are available for the design, manufacture and installation of a wide range of processing equipment



INTERMIX. A robust high efficiency Heavy Duty Internal Mixer for breaking down and mixing natural and synthetic rubbers at lower-than-normal temperatures. It is supplied with steam heating for plastics and other materials, and the exclusive rotor design ensures consistent high quality mixing.



CALENDER. A comprehensive range of Francis Shaw Calenders is available for the processing of all rubber and plastic materials. Flood Lubrication and hydraulic roll balancing available on all production sizes. Roll Bending can be fitted as an additional refinement. All sizes available from 13" x 6" to 92" x 32". Two-, Three, and Four-Bowl Designs.

Adamson United Co., 730 Carroll Street, Akron, have the manufacturing and selling rights of the Shaw Intermix and hold non-exclusive selling rights in Central America, South America, and Mexico.

FRANCIS SHAW

QUALITY ENGINEERING FOR QUANTITY PRODUCTION

FRANCIS SHAW & COMPANY LIMITED MANCHESTER 11 ENGLAND

TELEPHONE EAST 1415-8 TELEGRAMS CALENDER MANCHESTER TELEX 66-357

LONDON OFFICE TERMINAL HOUSE GROSVENOR GARDENS SWI PHONE SLOANE 0675-6 GRAMS VIBRATE LONDON TELEX 2-2250

FRANCIS SHAW (CANADA) LTD GRAHAMS LANE BURLINGTON ONTARIO CANADA

TELEPHONE NELSON 4-2350 TELEGRAMS CALENDER BURLINGTON ONTARIO

P1156

immediately available in two types

National®

NAXOL*

CYCLOHEXANOL

National Aniline can deliver cars or drums of this important secondary alcohol from substantial Allied Chemical-integrated production in two types:

NAXOL—100% material
NAXOL D—freezing point depressed

Both are high quality products, low in ketones, phenol and moisture, made by a highly-efficient, direct catalytic process at our modern Hopewell, Va. plant.

If you use or contemplate using this versatile solvent and intermediate, we will welcome your inquiry for specifications, sample, price and delivery quotation on C/L or L/C/L quantities.

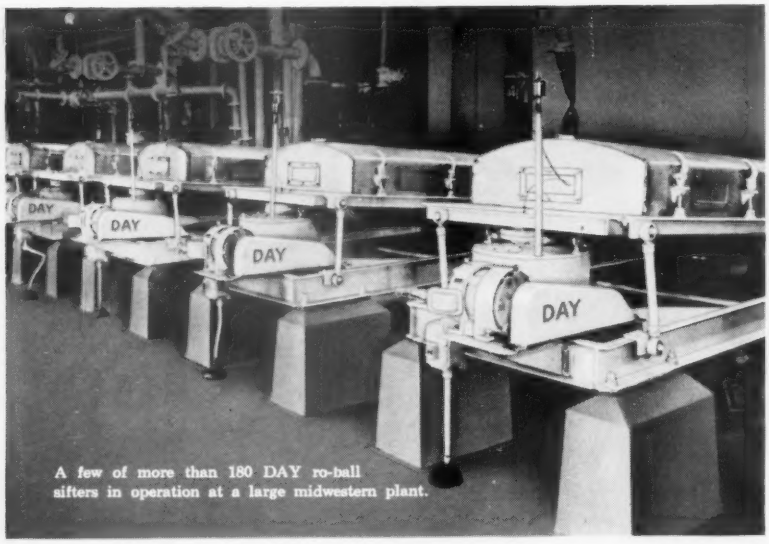
*Trade Mark

Allied Chemical

NATIONAL ANILINE DIVISION ALLIED CHEMICAL & DYE CORPORATION • 40 RECTOR STREET, NEW YORK 6, N. Y.

Akron Atlanta Boston Charlotte Chattanooga Chicago Greensboro Los Angeles New Orleans Philadelphia Portland, Ore. Providence San Francisco Toronto

SIFT finer-faster-cleaner with DAY ro-balls

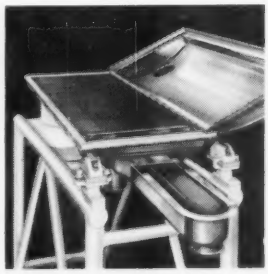


A few of more than 180 DAY ro-ball sifters in operation at a large midwestern plant.

Today thousands of products wet or dry, from flour to wood chips, are sifted through efficient, low-cost, high-production DAY ro-ball sifters. Superbly engineered, built for trouble-free operation under the severest service conditions, they insure longer life with lower maintenance costs.

The exclusive super active ball cleaning device provides rebound points in each ball compartment, assuring fast, thorough sifting of your product. Gyrating action brings material into constant contact with every square inch of screen surface. A stabilizer maintains screen in horizontal position and insures smooth operation.

DAY standard ro-ball, available in six sizes, single or multiple screens. Single screen models in stock.


Stainless steel units available to meet food and dairy sanitary codes.

Many models are available so it is easy to choose one which will exactly suit your requirements. They can be used separately or in combination with DAY mixers or blenders to save product handling. A completely equipped lab is available for testing your product.

Write for new DAY ro-ball Bulletin.

The **J. H. DAY** *Co.*
Division of The Cleveland Automatic Machine Co.
4918 Beech St., Cincinnati 12, Ohio
SERVING THE PROCESS INDUSTRY SINCE 1887

Shop Talk.....

► It is no secret that advertising is the life blood of any business paper and RUBBER AGE is no exception. Therefore, we are as keenly aware of "firsts" in the advertising line as we are where our editorial efforts are concerned. This current issue represents two "firsts" in advertising and we believe you will be interested in some of the details.

The first "first" is one you have already noticed, namely, the use of a wrap-around band on the issue. This is the first time such a merchandising tool has been used in the rubber trade press and we are grateful to the R. T. Vanderbilt Company for permission to use it. The second "first" is the use of the 12-page ad insert by the Texas-U. S. Chemical Company. This is the largest multi-page advertisement ever to appear in the rubber trade press. Its use keynotes the company's advertising program for 1958.

Obviously, the use of a 12-page ad insert costs a good deal of money and so we asked the Texas-U.S. Chemical people what they hoped to accomplish with this unique effort. After all, the company's polymers are fairly well-known to the rubber fraternity. We were told that there are several specific objectives behind this dramatic start of a new advertising program. These, in brief, are as follows:

To aggressively sell Texus Synpols on a competitive basis with other brands of synthetic rubbers, to establish the Synpol brand name as synonomous with the best in styrene rubbers, to sell the company as a dependable supplier to small business, to promote product improvements resulting from (a) improved manufacturing processes, (b) new or improved packaging developments, and (c) applied research, and to condition markets so that new products will gain quick acceptance. Among the latter are three completely new rubbers which will reach the market during the next several months.

Further conversation indicated that the concept and use of the multi-page advertisement was based on a realistic appraisal by the company and its advertising agency of the synthetic rubber market and the needs and opportunities of rubber product manufacturers. The sincerity of this appraisal is indicated in the theme of the advertisement, namely: "In a Buyers' Market."

We would be less than honest if we did not admit that we are extremely pleased with the fact that RUBBER AGE was selected to carry this important and expensive message to the rubber manufacturing industry. More important, we are delighted that the powers that be in this instance saw fit to utilize the business paper press despite the "consumer" type approach. Advertising and advertising-minded men will best appreciate this comment—and perhaps will do some soul searching of their own.

60 GRADES AND GRINDS MEET EVERY SULFUR NEED

PROCESSED CRUDE SULFURS
All grades 99.5% pure in sizes from 325-mesh to mixed fines and lumps.

REFINED INDUSTRIAL SULFURS
Grades range in fineness from 200-mesh through cones, sticks, lumps, solid barrels, all 99.85% minimum pure.

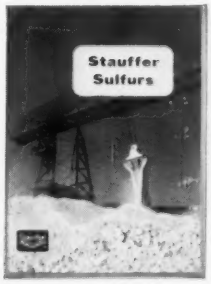
DISPERSED SULFUR
An aqueous dispersion, 68% sulfur, of particles averaging less than 2 microns in diameter.

RUBBERMAKERS' SULFURS
Specially formulated and standardized for tires, tubes and rubber specialties. Pure sulfur content from 68% (dispersed) to 99.8%. Sizes from 80- to 325-mesh.

CRYSTEX® INSOLUBLE SULFUR
Stauffer's insoluble sulfur, "Crystex", is a thermoplastic high polymer with a molecular weight in the order of hundreds of thousands. At least 85% of this material is insoluble in uncured rubber . . . does not migrate . . . eliminates "bloom".

AGRICULTURAL SULFURS
Among many grades are Dusting, Wettable, Dip and Coarse sulfurs for a wide variety of agricultural and livestock uses.

Stauffer is the country's largest user of sulfur and largest marketer of processed sulfurs.



Send for "The Newest Book on the Oldest Chemical". This 52-page book is not only a catalog of Stauffer Sulfurs but an authoritative treatise on Sulfur with many illustrations and useful tables.

STAUFFER CHEMICAL COMPANY

380 Madison Avenue, New York 17, N. Y.

Prudential Plaza, Chicago 1, Illinois

636 California Street, San Francisco 8, California

Stauffer CHEMICALS SINCE 1885

do you have a
RELEASE PROBLEM
with rubber?
plastics?
film casting?
medical plasters?
pressure sensitive tape?

PATAPAR® RELEASING PARCHMENTS PEEL OFF EASILY, CLEANLY

Gives satin-like finish to corrugated polyester Fiberglas sheets

Release backing for pressure sensitive surfaces

Separator for rubber tape

Protective release backing for medical plasters

These special Patapars show excellent performance in many processes involving: *synthetic rubber, polyurethane foams, polyesters, vinyl, organic adhesives, organosols, phenolics, acrylics.*

Features of Patapar Releasing Parchments include dense, fiber-free texture – high resistance to penetration or migration of oil and softeners – inertness to any surfaces they contact–rigidity or flexibility as desired – easily printable.

Samples and technical assistance freely available. Write us on your business letterhead.

Patapar®
RELEASING PARCHMENT

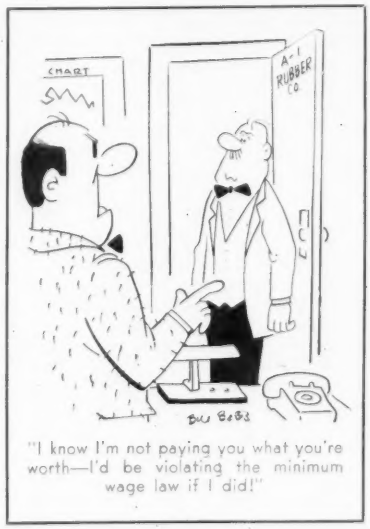
HEADQUARTERS FOR VEGETABLE PARCHMENT SINCE 1885

► It is generally estimated that only 10 per cent of all newspaper readers read the editorial in their particular paper. Magazine editorials usually do not fare much better. That is why it was gratifying for us to learn that several of the editorials which have appeared in this publication in the past year or so have been reprinted by various companies and distributed to customers. By the way, have you read this month's editorial?

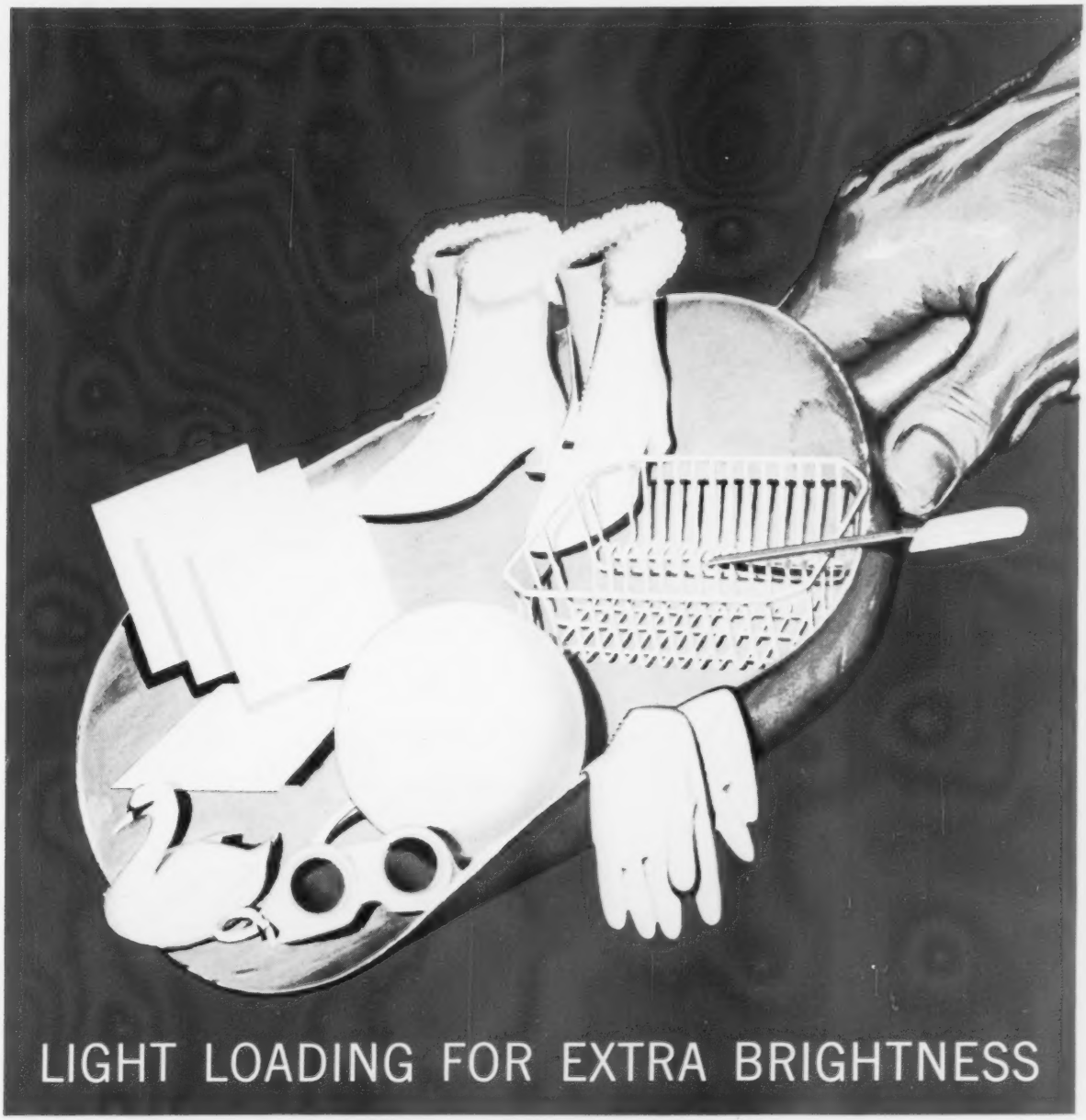
► Our "Special Industry Reports", somewhat a departure for us in the type of material published, are being well received by readers. Covering such subjects as executive compensation in the rubber industry and profits and overhead, the entire series has as its aim the presentation of administrative, financial and business data. This month's report deals with private placement financing in the rubber industry.

► A never-ending source of amazement to us all is the response evoked by the publication of the RUBBER RED BOOK. Some months after publication, we are still receiving messages, some of which appear in our "Letters to the Editor" columns. The publication of the RUBBER RED BOOK is, of course, a tremendous undertaking, reflecting as it does the growth of the rubber industry. The latest edition reports on some 1,500 rubber companies, some 200 more than in the previous edition.

► Something to watch for in the May issue of R/A will be the article on "High Speed Photography in the Rubber Industry." This article will cover the use of a high speed camera in the study of materials processing and products testing. Some of the techniques used in experimental design will be presented as well as data on suitable applications. Limitations on the use of the high speed camera in the study of rubber behavior will also be pointed out. Look for the article, we think you will find it rewarding.



"I know I'm not paying you what you're worth—I'd be violating the minimum wage law if I did!"



LIGHT LOADING FOR EXTRA BRIGHTNESS

There's ready wetting and easy dispersion in store for users of UNITANE O-220. High opacity and clear color tone are the result . . . an *economical* result because of the unsurpassed whitening power of this titanium dioxide pigment.

Production people will appreciate the freedom from agglomeration . . . the non-reactivity with rubber chemicals . . . the minimum loading requirements. The *only* effect of UNITANE O-220 in rubber compounding is the production of top-quality whites and pastels.

Full information and samples will be gladly furnished by your Cyanamid Pigments representative.

. . . because

UNITANE® O-220

TITANIUM DIOXIDE

is made to give rubber its ultimate in whiteness

CYANAMID

AMERICAN CYANAMID COMPANY
Pigments Division
30 Rockefeller Plaza
New York 20, N. Y.
Branch Offices and Warehouses in Principal Cities

WHITER AND BRIGHTER WITH UNITANE

GEN-TAC prevents

"wicking" in chafer fabrics

In co-operation with General Tire's technical staff, tire fabric manufacturers have found the best solution to one of the tire-maker's most troublesome problems—air "wicking" through chafer fabric! Gen-Tac® is the answer . . . used on multifilament cord, its outstanding qualities assure positive protection against "wicking" and provide superior rubber-to-fabric adhesion.

A specially prepared Gen-Tac dip penetrates cords completely, binding each filament securely and permanently. Its exceptional adhesion unitizes the cords, preventing air passage through the chafer strip. Be sure your tire fabric, whether monofilament or multifilament, is treated with Gen-Tac, for best product performance.

THE GENERAL TIRE & RUBBER COMPANY
CHEMICAL DIVISION • AKRON, OHIO

Chemical Division GENERAL THE GENERAL TIRE & RUBBER CO. GEN-TAC®

Creating Progress Through Chemistry

Now Available . . .

PROCEEDINGS of the Third Rubber Technology Conference

Copies of all the papers presented at the Conference held in London on June 22-25, 1954, under the auspices of the Institution of the Rubber Industry, are presented in this volume, together with the discussions on each paper. The papers are world-wide in character and represent the latest thinking in the science and general technology of rubber. This informative volume is a **must** for all who wish to keep abreast of developments in the field.

TITLES OF PAPERS

Properties of Natural Rubber Latex

Micro-Gel in Latex and Sheet Rubber. *R. Freeman.*
Improved Rubbers by the Enzymatic Deproteinization of Skim Latex. *J. E. Morris.*
Stability of Ammoniated Latex and Soap-Stabilized Emulsions in the Presence of Complex Zinc Salts. *T. S. McRoberts.*
Variability of Hevea Latex. *W. L. Resing.*
Zinc Oxide Testing of Latex. *E. W. Madge, H. M. Collier,* and *J. L. M. Newnham.*
Hevea Latex: Its Structure and Viscosity. *G. Verhaar.*
Contribution to the Study of Mineral Elements in Field Latex. *E. R. Beaufils.*
Rubber Peptized on the Plantation. *G. Giger, J. Lemee* and *M. Liponski.*

Production and Evaluation of Synthetic Rubber

Cation and Anion Influence in the Alfin Reagent for the Polymerization of Butadiene. *A. A. Morton, I. Nelidow* and *E. Schoenberg.*
Evaluation of Synthetic Rubbers and Latices. *I. D. Patterson.*
Recent Studies on the Structure of Synthetic Rubber. *R. F. Dunbrook, B. L. Johnson, J. L. Binder, J. M. Willis,* and *E. L. Carr.*
Rubbery Copolymers from Unsaturated Ketones. *W. Cooper, T. B. Bird,* and *E. Catterall.*
Preparation and Properties of Condensation Block Copolymers. *D. H. Coffey and T. J. Meyrick.*
Graft Polymers Derived from Natural Rubber. *G. F. Bloomfield, F. M. Merrett, F. J. Popham,* and *P. McL. Swift.*
Oil Resistance of Synthetic Rubbers Over Very Long Periods of Time. *B. Sörnö.*
Structure and Solution Properties of High Molecular Weight Butadiene-Styrene Copolymers. *R. B. MacFarlane* and *L. A. McLeod.*
Pyridinium High Polymers—A New Class of Oil-Resistant Synthetic Rubbers. *W. B. Reynolds, J. E. Pritchard, M. H. Opheim,* and *G. Kraus.*

Chemistry of Rubber

Studies in Latex Particle Surface Reactions: Kinetics of Hydrochlorination of Unvulcanized and Vulcanized Latices. *M. Gordon* and *J. S. Taylor.*
Oxygen-Absorption Effects in Cured and Uncured Rubber. *R. L. Stafford.*
Infra-Red Spectroscopic Analysis of Elastomers. *W. H. T. Davison* and *G. R. Bates.*
Structural Characteristics of the Sulfur Linkage in Natural Rubber Vulcanizates. *L. C. Bateman, R. W. Glazebrook, C. G. Moore,* and *R. W. Saville.*
Chemical Reactions of Antioxidants Used in Vulcanized Rubber. *P. Schneider.*
Cross-Linking and Radiation Effects in Some Natural and Synthetic Rubbers. *A. Charlesby* and *D. Groves.*

Physics of Rubber

Modification of the Permeability of Natural Rubber Vulcanizates. *P. Thirion.*
Reinforcement and Tear Strength Anisotropy. *H. J. J. Janssen.*
Elasticity of Ideal and Real Rubberlike Materials. *H. M. James* and *E. Guth.*
Study of Rubberlike Polymers by Nuclear Magnetism. *B. A. Mrowca* and *E. Guth.*
Natural Rubber Compounds for Intermittent Low Temperature Service. *W. P. Fletcher, A. N. Gent,* and *R. I. Wood.*
Theoretical Model for the Elastic Behavior of Filler-Reinforced Vulcanized Rubbers. *L. Mullins* and *N. R. Tobin.*
Non-Linearity in the Dynamic Properties of Rubber. *A. R. Payne.*

Developments in Testing Methods

Tear-Down Adhesion Testing. *B. Pickup.*
Constant Power Principle in Abrasion Testing. *E. F. Powell* and *S. W. Gough.*
Changes of Electrical Resistance of Rubbers Loaded with Carbon Black. *D. G. Marshall.*
Tire Cord Fatigue and Fatigue Testing. *R. S. Goy.*
Pneumatic Tire Testing. *J. I. S. Williams* and *R. G. Clifton.*
Fast, Easy Test for Measuring Relative State of Cure. *L. R. Sperberg.*

Compounding: Theory and Practice

Nature of "Chemisorptive" Mechanisms in Rubber Reinforcement. *V. A. Garten* and *G. K. Sutherland.*
Interaction of Rubber and Fillers During Cold Milling. *W. F. Watson.*
Role of Intermediate Level Carbon Blacks in Rubber. *I. Drogin.*
Role of Particle Diameter and Linkage Formation in Rubber Reinforcement. *A. F. Blanchard.*
Lignin as a Compounding Ingredient for Natural Rubber. *I. Sagajllo.*
Mooney Viscosity of Carbon Black-Rubber Mixtures. *M. Studebaker.*
Oil Extension of Natural Rubber, *G. J. van Amerongen* and *H. C. J. de Decker.*
Behavior of Highly-Filled Rubber Vulcanizates. *K. C. Bryant* and *D. C. Bissett.*
Rubber Reinforcement by Resins Formed in Latex. *J. van Alphen.*

Miscellaneous Technology

Abraded Filament Tire Cord. *E. R. Gardner, A. E. Herbert* and *W. C. Wake.*
Effect of Heat Setting on the Physical Properties of "Terylene" Polyester Fiber. *D. N. Marvin* and *T. J. Meyrick.*
Time Dependent Effects in Tire Cords. *J. O. Wood* and *W. F. Kilby.*
Wave Phenomena in Tires at High Speed. *D. M. Turner.*
Tread Wear and Fuel Consumption of Tires. *H. C. J. de Decker, R. Houwink,* and *G. J. van Amerongen.*

780 Pages **Completely Indexed**

$13.50 (postpaid)*

Send orders to:

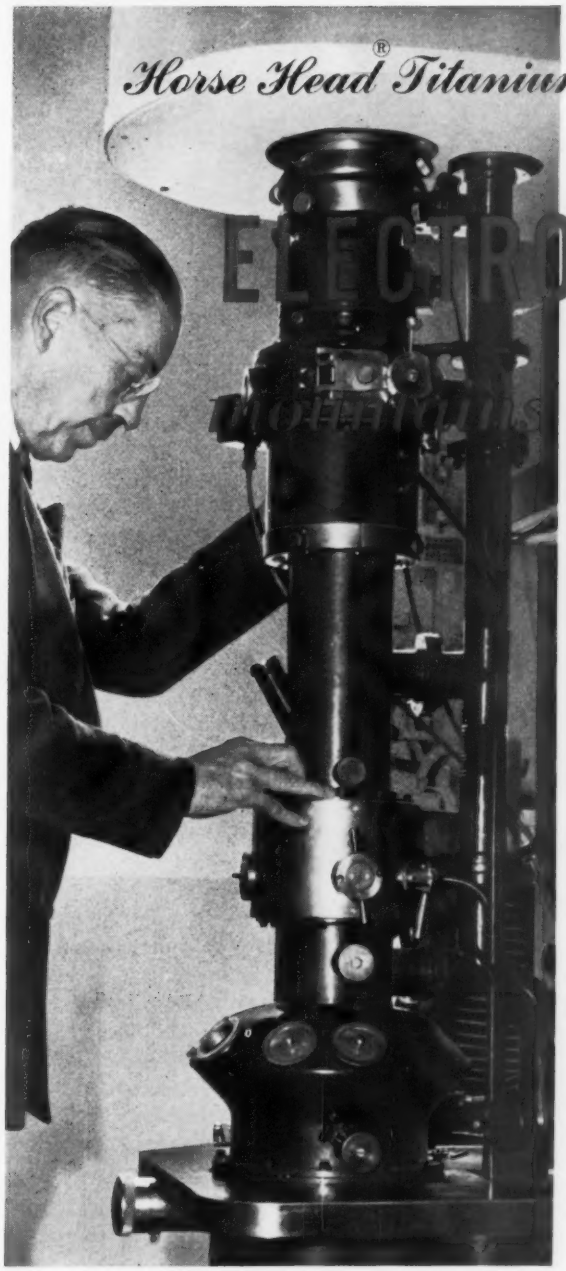
RUBBER AGE

Exclusive Sales Agents in the United States and Canada

101 West 31st Street, New York 1, N. Y.

* Add 3% Sales Tax for delivery in New York City.

Horse Head® Titanium Dioxide Research



ELECTRON EYES *make out of molehills*

. . . for Better Titanium Dioxide

ONLY an expert can measure the size of titanium dioxide pigment particles . . . and even he needs very special equipment. That combination is basic in our intensive research program for developing better titanium dioxides for you. Accurate particle size studies are a key to greater hiding power and whitening ability, and higher tinting strength.

In this field, as in many others, our Research Laboratories have a long record of pioneering.

In 1917 they developed the first practical method for measuring particle size of fine pigments. It was based on a new method of pigment dispersion and the use of a high-powered visible-light microscope.

In 1922 they were the first to apply the ultraviolet microscope to pigment studies. This enabled them to magnify and measure particles of colloidal size.

In 1942, soon after the electron microscope became available, our laboratories were quick to apply this new tool to pigment research. It has made possible the accurate measurement of even the finest particles, as the instrument employs electron beams instead of light rays.

Such research is reflected in the ever higher standards of performance you obtain with HORSE HEAD zinc oxides, zinc sulfides, and titanium dioxides.

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Can you improve a GRS compound with one of these resins?

If you are interested in upgrading the properties of GRS compounded stocks, you may find one of these Durez phenolic resins useful.

They serve as effective plasticizers during processing, and also contribute materially to hardness, stiffness or boardiness, and abrasion resistance. These properties are of particular interest for such applications as shoe soles, top lifts, and tire beads.

Generally only 5 to 10 parts of resin per 100 parts of GRS will produce, with normal loading, Shore A hardness of 90 to 100.

Since the resins are thermosetting, the qualities they impart are retained at elevated temperatures. This constitutes a major advantage of phenolic resins over thermoplastic materials sometimes used to increase hardness and stiffness.

Compatibility • Phenolic resins do not have complete compatibility and reactivity with GRS as they do with nitrile-type rubbers. However, you can greatly increase compatibility by using some nitrile rubber in the formulation, serving as a common solvent or flux. This procedure greatly improves over-all physical properties of the vulcanized material.

For use in GRS compounded stocks, we recommend the following resins:

12687 powdered resin • This resin is used only in those instances where nitrile rubber is used as the common solvent or flux. It is more compatible with nitrile rubber than are the other resins recommended for use with GRS.

13355 powdered resin • This resin is most generally used with GRS. It is lighter in color than 12687 and more effective, when used without nitrile rubber, in increasing hardness and stiffness. It is suitable for so-called "light oak" shoe soling.

13349 lump resin • This is the base resin used in producing 13355. In this form, it is entirely thermoplastic and is safe for use where high processing temperatures are encountered, as in Banbury mixing. It requires addition of 8% hexamethylenetetramine to make it properly thermosetting and give properties equivalent to 13355. The hexa is added either at the last stage of Banbury or on the warm-up mill.

Where else can Durez resins help you get properties you want?

Nitrile rubber compounds • Completely compatible with nitrile rubbers, Durez resins soften and plasticize the stock, then aid vulcanization with substantial gains in strength, hardness, stiffness, abrasion resistance, heat and chemical resistance of the final cured stock. Compatibility and reactivity increase with increasing nitrile content.

Solvent-type adhesives • You can produce excellent adhesives using Durez resins with nitrile rubber, natural rubber, and Neoprene. Durez resins have been used successfully as an adhesive for bonding uncured and cured nitrile rubber stocks to various metals during molding.

Synthetic rubber latices • A highly effective means of hardening and reinforcing nitrile rubber latices is the use of Durez resin emulsions developed for this purpose. For modifying the properties of latex-treated papers, a water-soluble liquid resin is available. So far, the use of these resins is confined mainly to nitrile rubber latices. However, one Durez resin has produced very satisfactory results with certain high-styrene-butadiene latices.

For a more complete description of the application of Durez resins in compounding, in solvent cements, and in modification of latices, write for the illustrated bulletin, "Durez Resins in the Rubber Industry."

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PLASTICS DIVISION

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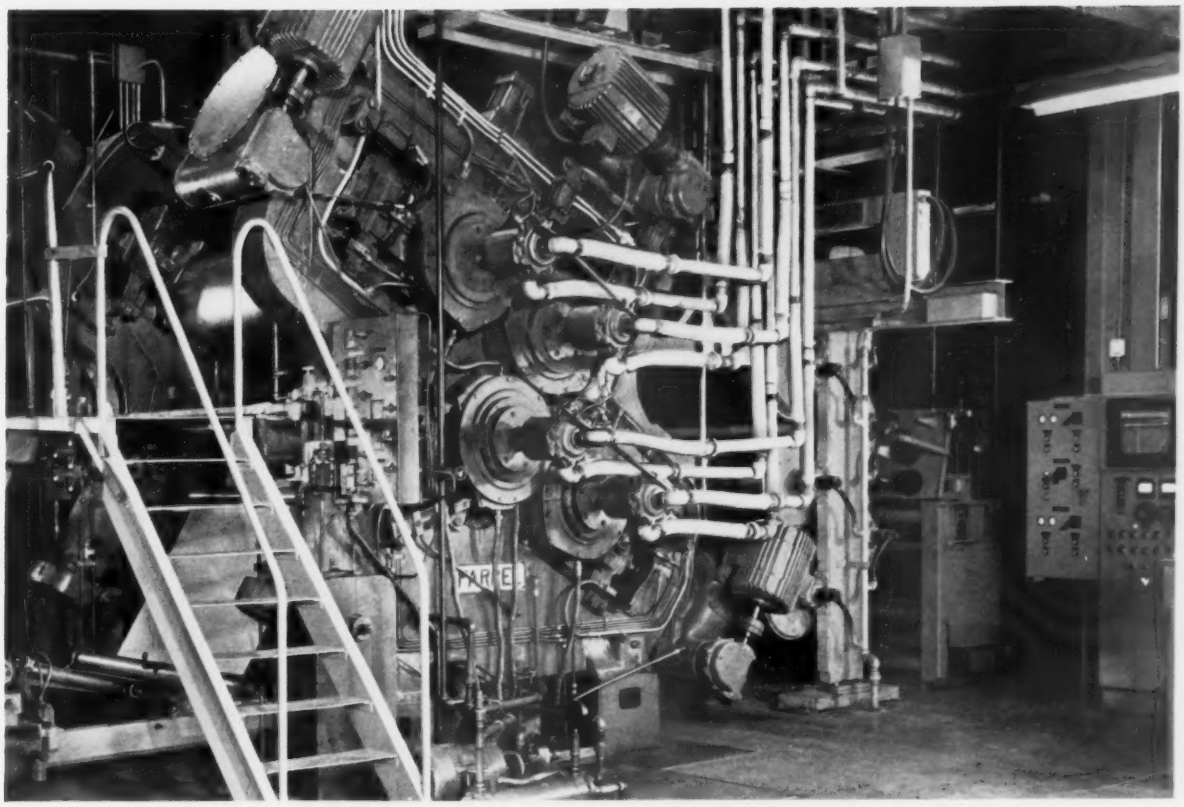

CROSSED-AXES ACCURACY!

How it helps to improve the quality of Cooper tires

Key unit in a new tire-cord train, installed by Cooper Tire & Rubber Co., is the Farrel-Birmingham® four-roll, inclined "Z" calender pictured here. This machine, says William P. Zimmerman, project engineer, "by controlling uniform thickness and gauge of the tire cord, greatly improves the quality of our product."

Used to double-coat nylon cord with rubber within close tolerances, the calender features two motor-operated crossed-axes devices — one for each bank pass. Push-button adjustments can be quickly made to compensate for variations in stock composition, gauge and speed.

The 24" x 68" calender rolls are inclined at an angle. This arrangement — pioneered by Farrel-Birmingham — has many advantages, including better visibility of bite and greater accessibility to the rolls.

All gears are removed from the rolls and installed in a separate Uni-drive. Power is transmitted smoothly through special universal spindles.

Ask for further information on the inclined "Z" calender.

FARREL-BIRMINGHAM COMPANY, INC.
ANSONIA, CONNECTICUT

Plants: Ansonia and Derby, Conn., Buffalo and Rochester, N. Y.
Sales Offices: Ansonia, Buffalo, Akron, Chicago, Ann Arbor (Mich.), Los Angeles, Houston, Baton Rouge, Fayetteville (N. C.)
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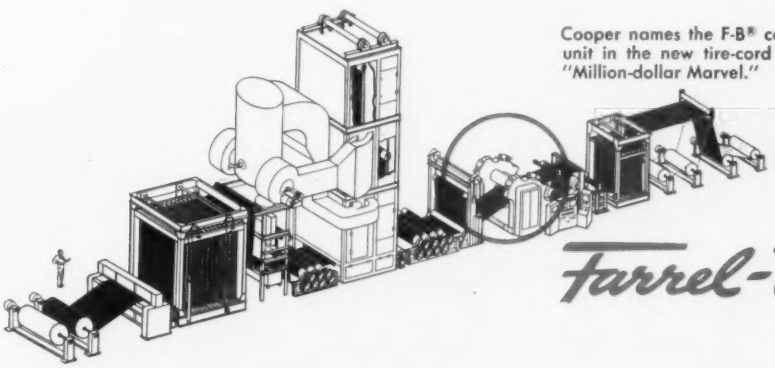
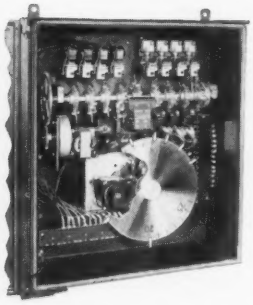


Cooper names the F-B® calender the principal unit in the new tire-cord train they call their "Million-dollar Marvel."

Farrel-Birmingham®

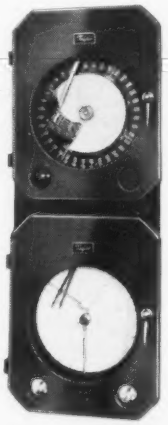
FB-1132

These TAYLOR CONTROLS



The new Taylor FLEX-O-TIMER* Timed Program Controller gives greater precision than ever to the timing and coordination of automatic presses used for vulcanizing tires or any mechanical goods. Actuates switches, turns valves, and performs many other operations involving temperature, pressure, mechanical motion, electrical energy or any combinations of these.

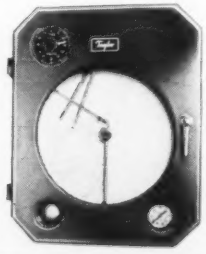
can save you money



Taylor's FULSCOPE* Time-Schedule controller will repeat exactly any predetermined program involving temperature, pressure, flow or level, or any two of these. It controls rate of rise, hold periods, and rate of fall, in any desired sequence. Ideally suited for any type of vulcanizer.

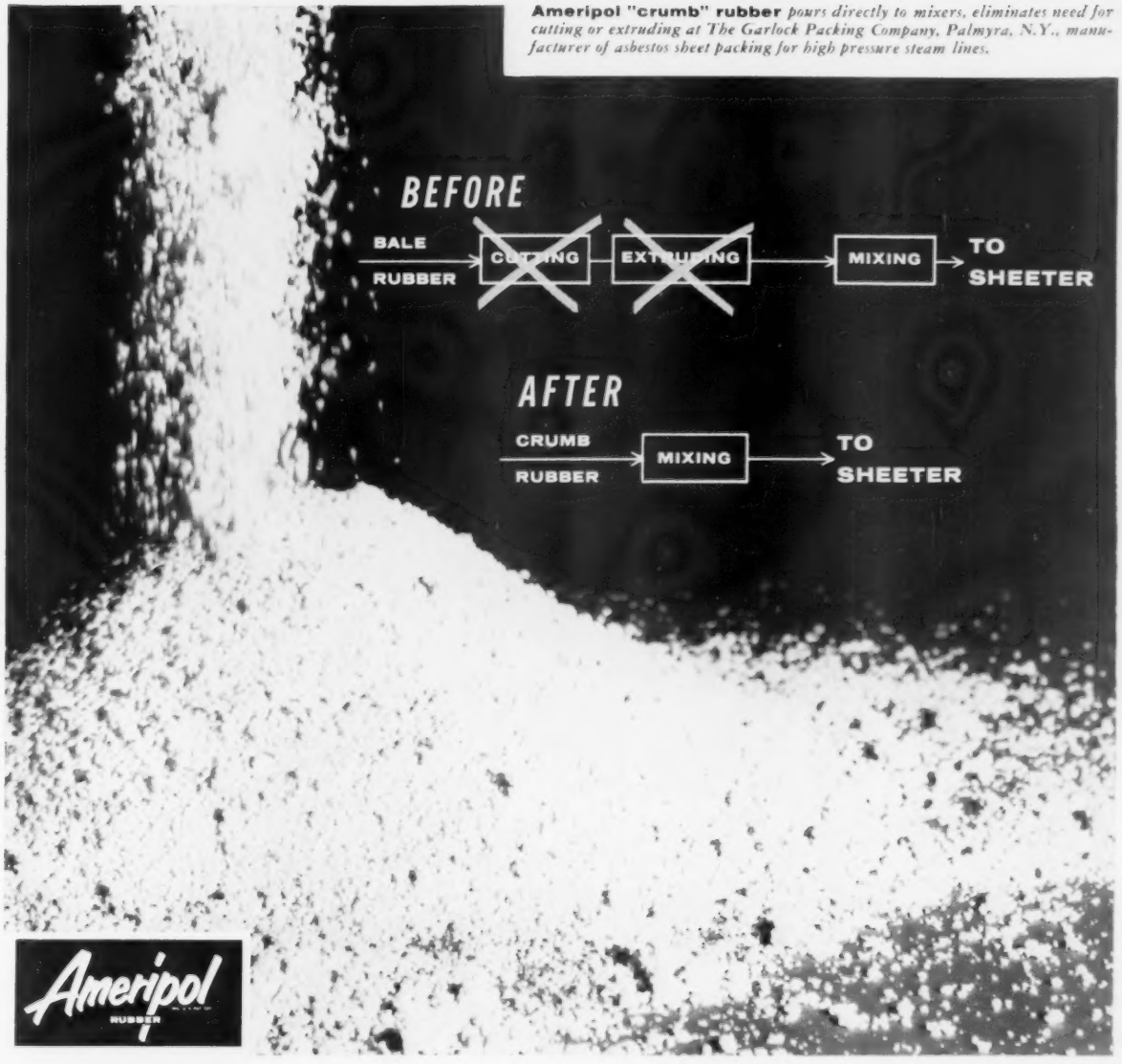
making most any Rubber Product!

Taylor's FULSCOPE Temperature Controller with Process Timing mechanism controls temperature and curing time of cycle. Automatic timing starts when set temperature is reached. Needs no manual attention until signal light announces cycle completion. Ask your Taylor Field Engineer, or write Taylor Instrument Companies, Rochester, N. Y., or Toronto, Ontario.



*Reg. U.S. Pat. Off.

Taylor Instruments MEAN ACCURACY FIRST



Ameripol "crumb" rubber *pours directly to mixers, eliminates need for cutting or extruding at The Garlock Packing Company, Palmyra, N.Y., manufacturer of asbestos sheet packing for high pressure steam lines.*

eliminates two processing steps; cuts mixing time in half!

Processing costs really tumbled when The Garlock Packing Company switched to Ameripol "crumb" polymers as the adhesive filler for asbestos sheet packing. New "crumb" Ameripol goes right into the mixer with no prior processing. Formerly, it was necessary to cut and extrude rubber to convert it to spaghetti-like form before mixing.

The rubber is dissolved in a solvent to mix with asbestos and produce a uniform mixture before sheeting. "Crumb" Ameripol with its small particle size and extra porosity soaks up solvent faster. Mixing time is cut from 3 hours to 1½.

This new form of butadiene-styrene rubber was developed by Goodrich-Gulf research for just such savings in processing and equipment. "Crumb" form hot polymers are available in production quantities to cut your processing costs, too.

Call us for your requirements

Goodrich-Gulf Chemicals, Inc.

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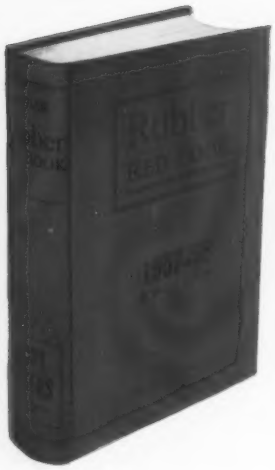

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1957-58 RUBBER RED BOOK

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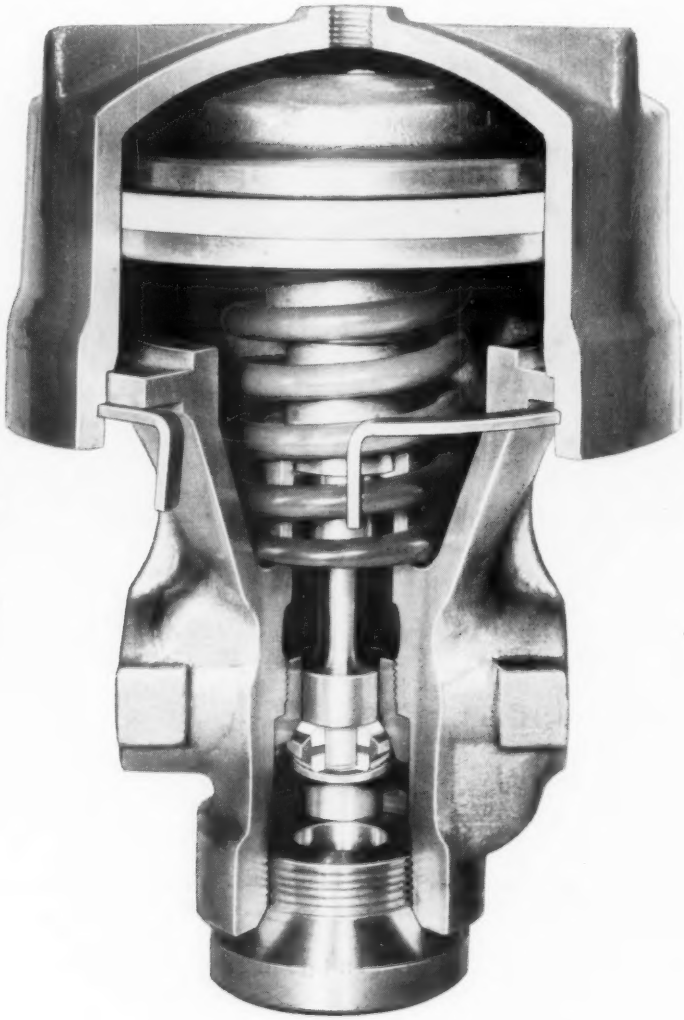
Low maintenance. Taylor-Emmett's new valves are ideal for liquid lines to and from presses. They require practically no maintenance because Teflon disc, unlike metal, resists wear, won't warp or foul . . . never needs grinding. The Teflon disc molds to the valve seat, even under adverse conditions. This unique construction of the valve disc encloses the Teflon so that it can only flow back into the retainer.

Simple, maintenance-free. Type D532 cylinder operated valve represents a major step forward in simple, compact valve design. Its unique snapring assembly lets you disassemble the cylinder operator and change the stem and disc in just a few minutes, without removing the valve from the line.

Half the maintenance...one quarter the parts sums up the benefits of all Taylor-Emmett valves.

Taylor-Emmett valves are now available through your Taylor Field Engineer. For further information contact him, or write for catalog to Taylor-Emmett Controls, Inc., Akron, Ohio, or Taylor Instrument Companies, Rochester, N. Y.

Minimum Maintenance with New Taylor-Emmett NEV-R-GRIND* Valves...



New Teflon disc design means:

NO GRINDING!

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Type D532 is typical of Merit semi-balanced, cylinder operated, air 50 to 100 psi. 2-way normally open, normally closed, and 3-way valves. Pressure to 750 psi. Bronze body. Screw connections. Size ½" to 2½".

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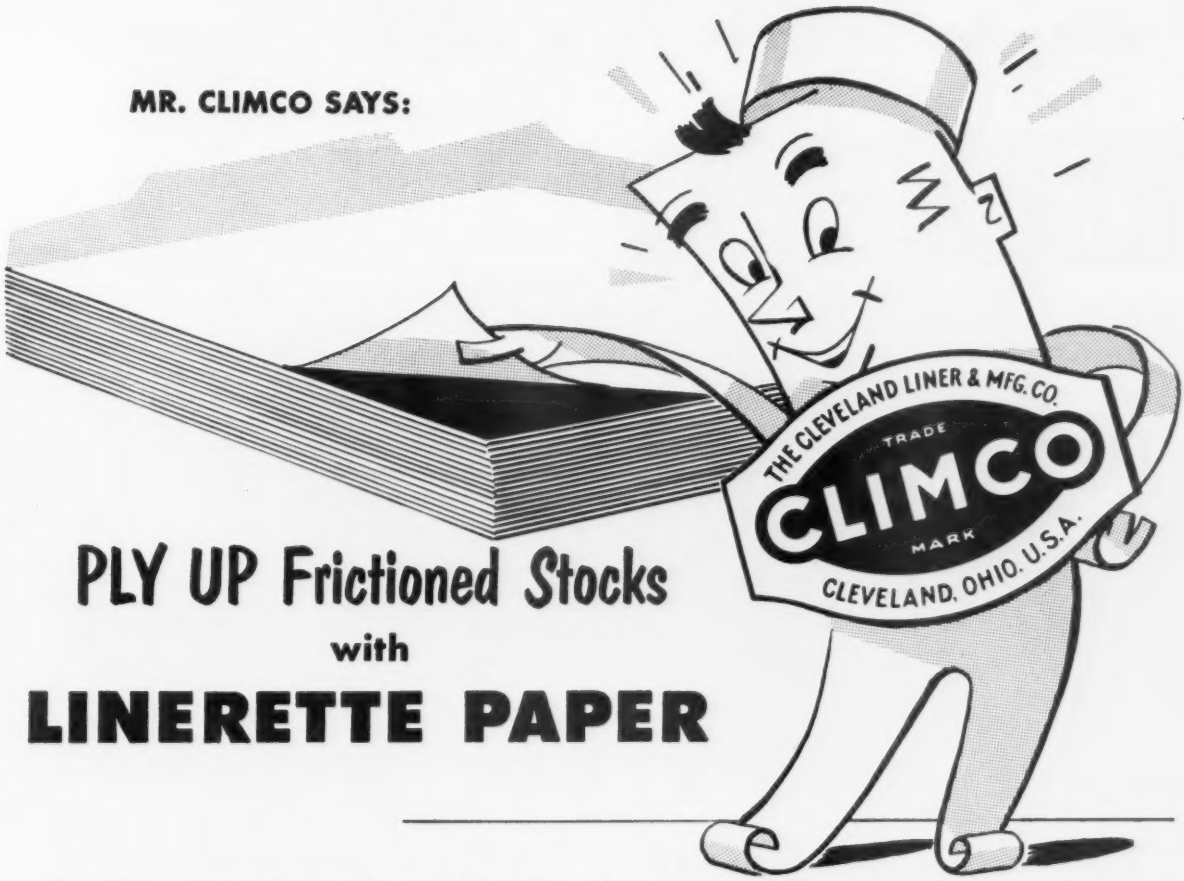
MR. CLIMCO SAYS:



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You will save time and money by using Linerette separating paper to ply up frictioned stock before cutting in the clicking operation. Frictioned stock can be fed from the calender right into Linerette. This specially processed paper contains no oil or wax, prevents adhesion and insures fast, clean separation . . . leaves no cloth marks.

OTHER LINERETTE ADVANTAGES:

- **Preserves tack.**
- **Protects lightweight stocks in shipment—no fabric needed.**
- **Clippings may be mixed with scrap and worked away when used in die-cutting operations.**
- **Where cleanliness is essential, use Linerette as a low cost lining for trays and containers.**
- **Used in rolls or sheets with most types of lightweight stocks.**

Linerette is available in any width up to and including 54″, in rolls of 9″, 11½″, 13″ and 15″ diameters, on cores of 3″ i. d. The yield is approximately six square yards to the pound. A 9″ roll contains approximately 375 linear yards and a 15″ diameter approximately 1150 linear yards. *Ask for a sample today, just specify desired width.*

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Here at last is the answer to your problems of dicing rubber or vinyl sheet stock. Produces perfect cubes ranging in size from ⅛ to ½" by merely changing knives.

Comes in two sizes designed to handle sheets up to 7" or 14" in width. Other sizes made to order.

Input speeds range from 10 to 125 feet per min. depending on material and size of cube desired.

The CUMBERLAND Rotary Chopping and Dicing Machine

As a chopper, this machine efficiently cuts rubber and vinyl slabs into small pieces. Two sizes available to handle stock widths up to 14 or 24 inches.

As a dicer in modified form, handles principally vinyl sheet stock. A less expensive machine though less universal than the "Stair-Step" Dicer shown above.

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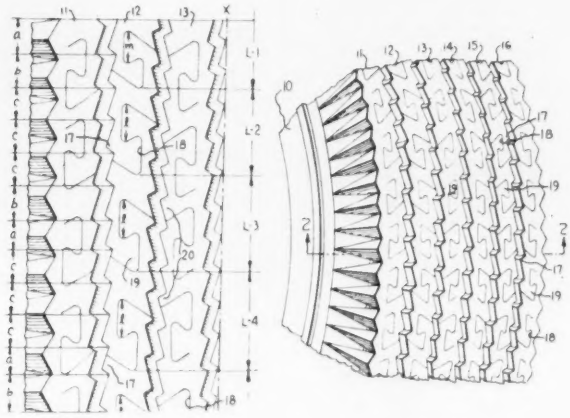
Builders of Better Machines for the Rubber and Plastics Industry

PATENT REVIEW

by Melvin Nord

Noiseless Tire Tread Construction

U.S. 2,808,867, issued October 8, 1957, to Frederick E. Buddenhagen and Eugene A. Roberts, and assigned to Armstrong Rubber Co., describes an arrangement of the tractive elements on the tread of tires for reducing the noise of the tires on the road.



The spacing and therefore the timing of the impacts on the pavement of the individual design elements and of the sipes is varied sequentially along the circumference of the tire, in such a way as to prevent resonance of the sounds originating from the tractive elements. The tire is shown at the right of the diagram and part of one section of the tread design is seen on the left.

Elastic Polyurethane Elastomer Composites

U.S. 2,805,182, issued September 3, 1957 to Victor L. Hallenbeck, assigned to B. F. Goodrich Co., describes an elastic composite structure in which an elastomeric polyurethane, a tie-gum composition, and an unsaturated elastomer are adhered together so as to resist separation during high temperature flexing. The binder is a vulcanizable tie-gum composition consisting of natural rubber and a finely divided carbohydrate such as sugar or starch.

Vulcanized Rubber-Silica Composition

U.S. 2,806,012, issued September 10, 1957 to Edward M. Allen and assigned to Columbia-Southern Chemical Corp., describes a novel rubber composition consisting of a vulcanized mixture of natural or synthetic rubber and a precipitated siliceous pigment which has unusual

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Dead-load hardness tester providing a truly accurate and reproducible standard for expressing rubber hardness.

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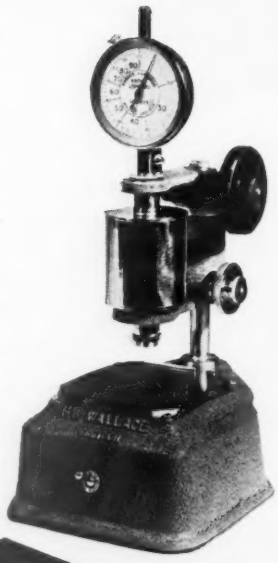
★ Simple operation, human error eliminated.



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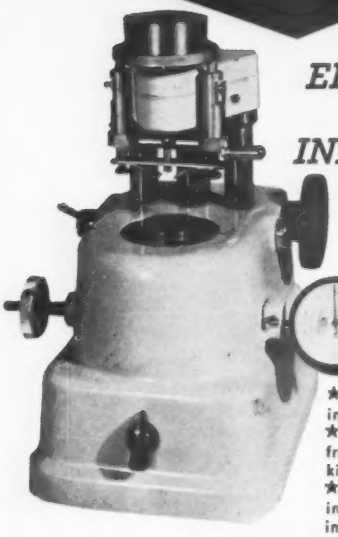

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★ Indenting dead weight load from fraction of a gram to 3½ kilograms.

★ Indentation depth measured in inches or millimeters to within 1/10th of a micron.

Ask for detailed information on these and other instruments.

TESTING MACHINES, INC.

Manufacturers and distributors of the finest test equipment.

72 Jericho Turnpike, Mineola, L. I., N. Y.

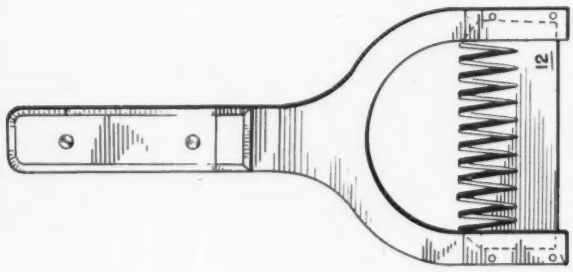
PATENT REVIEW

strength properties, e.g., tensile strengths above 2400 pounds per square inch.

The siliceous pigment consists of finely divided precipitated silica in the form of porous flocs, the silica containing more than 90% SiO_2 measure on the anhydrous basis, bound water in the proportion of about 6 moles of SiO_2 per mole of bound water, and 2 to 10% free water by weight of the pigment, with a surface area of 75 to 175 square meters per gram, and an average ultimate particle size of 0.015 to 0.05 micron. The patent describes several methods of preparing this pigment.

Rubber Tire Trimming Tool

U.S. 2,807,877, issued October 1, 1957, to James J. Fryer and Charles T. Cronin, Jr., describes a tool for removing the projecting rubber spikes or ridges remaining on a tire after it has been removed from the mold.



The tool, shown in the accompanying illustration, has a deep throated blade with teeth set close together. These teeth have long sharpened edges in V-form relation. This blade catches the spikes in between the edges of its teeth and converges on them. This snips or cuts them off and carries them off the blade and tire. When the blade becomes worn and dull it is removed from its handle and replaced by another.

Preparation of Cellular Rubber

U.S. 2,806,823, issued September 17, 1957 to Frank A. V. Sullivan, assigned to American Cyanamid Co., relates to a method of preparing cellular and foam rubber, using a new class of blowing agents, consisting of N, N′-alkylenebisbenzosulfotriazenes.

The patent describes several methods of producing such compounds, as well as their use in producing cellular and foam rubbers.

Anti-Skid Vehicle Tire

U.S. 2,806,502, issued September 17, 1957 to Louis J. Andy, assigned to Andy Bros. Tire Shop, provides an anti-skid composition for use in tires, which does not cause any noticeable decrease in the life of a tire.

The tread material consists of natural or synthetic rubber, cured and having interspersed within it hard

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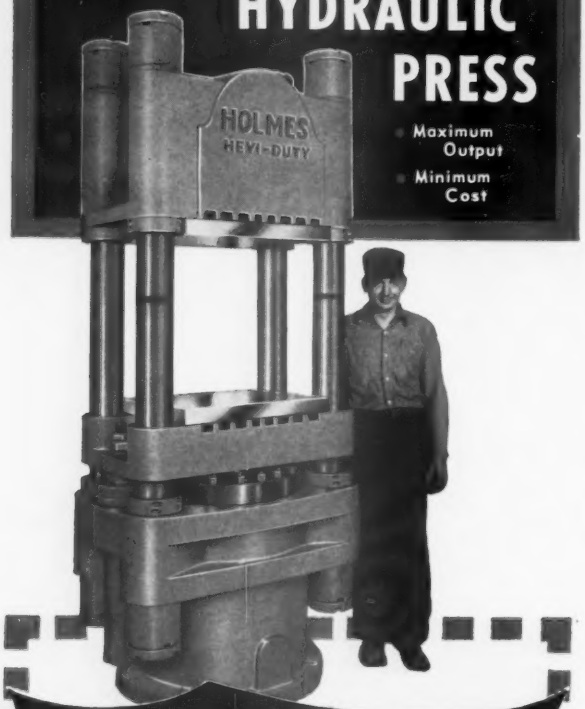

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PATENT REVIEW

fibrous particles, such as hard or soft wood chunks (about 16 mesh) in the form of cubes and slivers of irregular shape with projecting corners and edges. The optimum percentage of wood particles is 5 to 7% by weight.

Glass Fiber Reinforced Rubber-Resin Product

U.S. 2,794,792, issued June 4, 1957 to Charles L. Petze, assigned to Delaware Research & Development Corp., relates to vulcanized products of a vulcanizable elastic rubber, a reactive and compatible resin and a substantial portion of glass fiber reinforcement. The product is characterized by superiority in impact strength, elastic recovery, cut and abrasion resistance, and dimensional stability.

Styrene rubber is preferred as the elastomer component, and a resinous copolymer of styrene and butadiene with the styrene predominant is the resinous component. The reinforcing glass fiber must make up at least 10% by weight of the total composition, and must not exceed 50%. The glass fibers have a diameter from 10^{-3} to 10^{-6} inch. The average fiber length is 1/64 to 1/8 inch.

Method of Cleaning Latex Equipment

U. S. 2,810,665, issued October 22, 1957, to Antoni Szayna and assigned to United States Rubber Co., describes a method of cleaning equipment used for handling or processing rubber latex, such as packed towers.

The true coagulum from Hevea latex removed with greatest difficulty is composed mainly of rubber with a high gel content. It is insoluble in any of the usual solvents. Hydrocarbon solvents swell it but they do not dissolve it unless the gel is also broken down by milling or similar mastication. It has been found that these gel particles (true coagulum) cannot be removed from the packing by alkalis or soap solutions or by hydrocarbons (like benzene, toluene or petroleum naphtha) or by combinations of these, whether applied at room temperature or at boiling temperatures. However, the removal of the coagulum from the tower or other equipment is easily accomplished *in situ* with the aid of a chemical softener for rubber, contained in a rubber solvent, and applied in the presence of available oxygen, preferably at elevated temperature and preferably with mechanical agitation.

The chemical softeners for rubber employed in this case constitute a class of materials that are sometimes referred to as "peptizers," and also as pro-oxidants, or oxidation catalysts. Among the known peptizers or promoters of chemical plasticization of rubber may be mentioned the mercaptans, e.g., xylyl mercaptan, beta-naphthyl mercaptan and the tertiary mercaptans in general, hydrazines such as phenylhydrazine, nitroso compounds such as para-nitroso-dimethylaniline, AZO compounds such as para-hydroxyazobenzene, thiazoles

Worker holds 2802 Hose Line of Teflon in curing mold. When tire carcass is inserted, hose line supplies steam pressure to inflate it against mold.

Aeroquip 2802 Hose of Teflon* Solves Steam Line Problem

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A flexible steam line made of Aeroquip 2802 Hose of Teflon promises to solve a production bottleneck for one tire producer. Used on steam curing molds, it replaced rigid pipe and swivel joints that were a constant replacement problem due to steam leakage. Service life of 2802 Hose of Teflon is practically limitless in this application.

Aeroquip 2802 Hose of Teflon gives unequalled performance wherever extreme fluid temperatures are encountered (up to 500°F.) or where chemical stability, lubricity, flexing and long service life of the hose are critical factors. Use of detachable, reusable "*super gem*" Fittings permits quick hose line assembly and disassembly right in your plant, using ordinary bench tools.

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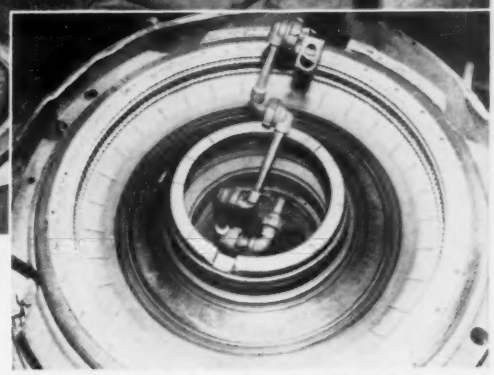
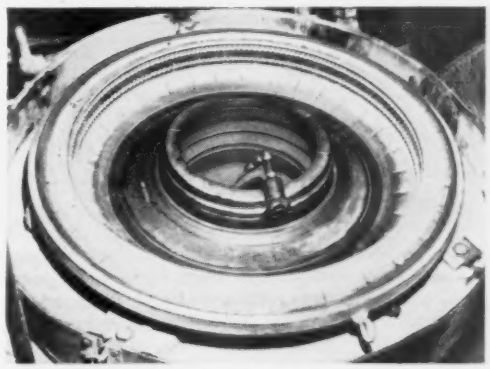


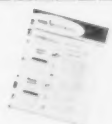
Before: Pipe and swivel joints formerly used required constant maintenance due to leakage at swivel joints.



After: Aeroquip 2802 Hose of Teflon withstands constant flexing under high steam temperature without leaking.

*DuPont tradename for its tetrafluoroethylene resin.
"*super gem*" is an Aeroquip Trademark.

AEROQUIP CORPORATION, JACKSON, MICHIGAN RA • 4



Please send me a copy of Bulletin IEB-26B on Aeroquip 2802 Hose of Teflon.

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PATENT REVIEW

such as mercaptobenzothiazole, and aryl sulfides such as di-ortho-benzamidophenyl disulfide. Phenylhydrazine is the preferred softener. It is generally used in concentrations of from about 0.5 to about 5%, on the weight of the solvent, higher concentrations being unnecessary and uneconomical.

The solvents employable in the invention include all solvents for rubber and their mixtures, including hydrocarbons, chlorohydrocarbons and ethers, such as benzene, xylene, tetrahydronaphthalene, decahydronaphthalene, turpentine, gasoline, petroleum and coal tar naphthas of boiling range from 50° to 200°C., 80° to 110°C., or 130° to 180°C., kerosene, chloroform, carbon tetrachloride, and disopropyl ether, as well as carbon disulfide and other rubber solvents.

A trace of oxygen is supplied in the form of air or gaseous oxygen or in the form of a peroxy compound. These are used at least in traces (e.g., 0.01%) or in amounts up to 1 or 2% or more of the weight of the solvent.

The cleaning process is facilitated by employing elevated temperatures, preferably between 40° and 180°C. Higher temperatures, e.g., 200°C., may also be employed, especially when operating under pressure. Lower temperatures, e.g., 20°C., may be used but require longer cleaning times.

Mechanical action of the solution on the gel particles accelerates the cleaning process. Such mechanical action may be exerted in various ways, for example by: (a) refluxing the solution, in which case the reflux leaches the coagulum, or (b) filling the tower with the solution and bubbling in air from the bottom of the tower, or (c) pumping the solution continuously from the bottom to the top of the tower, and (d) stirring in the case of autoclaves or tanks.

Other Patents Of Interest

Subject	Inventor or Assignee	Patent No.	Date
Molding apparatus	United States Rubber Co.	2,798,253	7/9/57
Press for vulcanizing footwear	Christian Canat	2,798,254	7/9/57
Molding elastomers in destructible molds	General Motors Corp.	2,798,257	7/9/57
Water bottle	United States Rubber Co.	2,798,522	7/9/57
Tubeless tire	United States Rubber Co.	2,798,526	7/9/57

Copies of any patents, including those described here, are available from the Commissioner of Patents, Washington 25, D. C., for 25 cents each. Do not send stamps.

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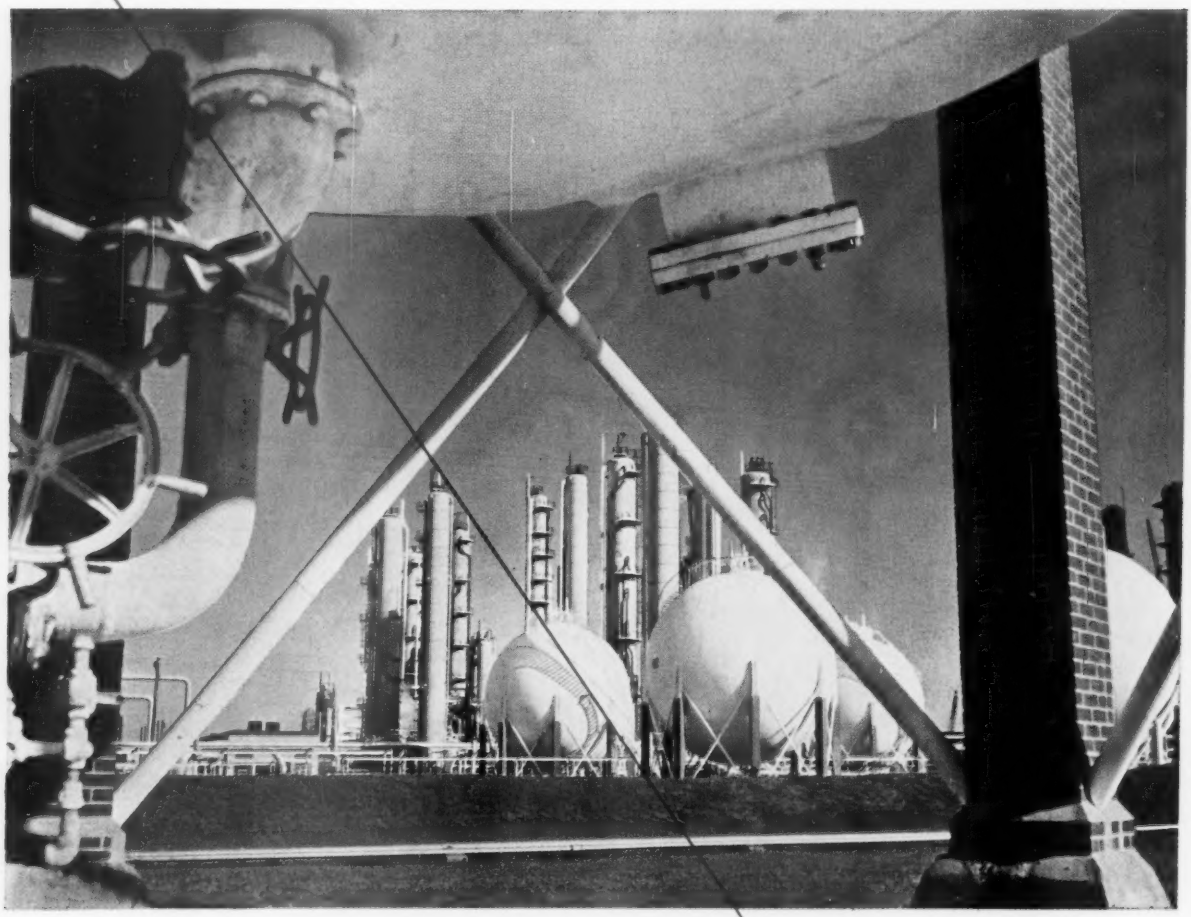

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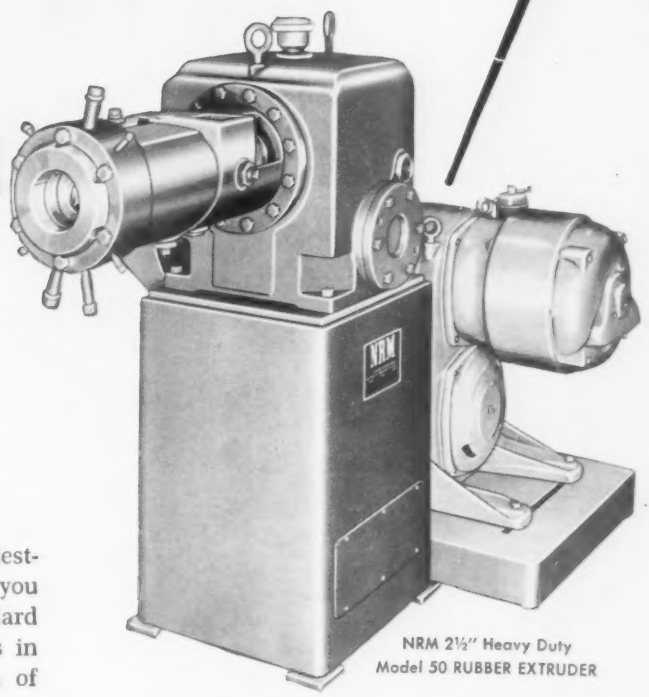

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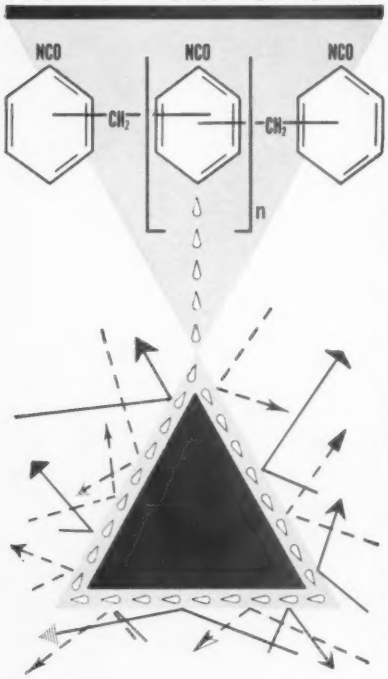

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COMING EVENTS

April 16. Washington Rubber Group.

April 17. Quebec Rubber and Plastics Group.

April 18. Detroit Rubber & Plastics Group, Spring Meeting, Detroit-Leland Hotel, Detroit, Mich.

April 25. Chicago Rubber Group. Furniture Club, Chicago, Ill.

April 25. Philadelphia Rubber Group, Poor Richard Club, Philadelphia, Penna.

May 9. Buffalo Rubber Group and Ontario Rubber Group, Joint International Meeting, Hotel Sheraton Brock, Niagara Falls, Ont., Canada.

May 14-16. Division of Rubber Chemistry, A.C.S., Spring Meeting, Netherlands Plaza Hotel, Cincinnati, Ohio.

May 21. Washington Rubber Group.

May 23. Connecticut Rubber Group.

May 28. Division of Rubber Chemistry, Chemical Institute of Canada, Annual Meeting, Royal York Hotel, Toronto, Ont., Canada.

June 5. New York Rubber Group, Summer Outing, Doerr's Grove, Millburn, N. J.

June 6. Fort Wayne Rubber & Plastics Group, Summer Outing.

June 10. Buffalo Rubber Group, Summer Outing.

June 13-14. Southern Rubber Group, Dinkler Plaza Hotel, Atlanta, Ga.

June 20. Akron Rubber Group, Summer Outing, Firestone Country Club, Akron, Ohio.

June 22-28. A.S.T.M. Annual Meeting, Hotel Statler, Boston, Mass.

June 27. Detroit Rubber & Plastics Group, Summer Outing, Western Golf and Country Club, Detroit, Mich.

July 25. Chicago Rubber Group, Golf Outing, Medinah Country Club, Medinah, Ill.

Aug. 5. New York Rubber Group, Golf Outing, Wingfoot Golf Club, Mamaroneck, N. Y.

Sept. 6. Connecticut Rubber Group, Summer Outing.

Sept. 10-12. Division of Rubber Chemistry, A.C.S., Fall Meeting, Hotel Sherman, Chicago, Ill.

Sept. 25. Fort Wayne Rubber & Plastics Group, Van Orman Hotel, Fort Wayne, Ind.

Oct. 3. Detroit Rubber & Plastics Group, Fall Meeting, Detroit-Leland Hotel, Detroit, Mich.

Oct. 14. Buffalo Rubber Group, Hotel Westbrook, Buffalo, N. Y.

Oct. 17. New York Rubber Group, Fall Meeting, Henry Hudson Hotel, New York, N. Y.

Oct. 17-18. Southern Rubber Group, Roosevelt Hotel, New Orleans, La.

Oct. 24. Philadelphia Rubber Group, Poor Richard Club, Philadelphia, Penna.

Oct. 24. Akron Rubber Group, Sheraton Hotel, Akron, Ohio.

Nov. 14. Connecticut Rubber Group.

Nov. 17-21. Society of the Plastics Industry Annual National Conference, Morrison Hotel, Chicago, Ill.

Nov. 30-Dec. 5. A.S.M.E. Annual Meeting, Hotel Statler, New York, N. Y.

Dec. 2. Buffalo Rubber Group, Christmas Party.

Dec. 4. Fort Wayne Rubber & Plastics Group, Van Orman Hotel, Fort Wayne, Ind.

Dec. 12. Detroit Rubber & Plastics Group, Xmas Party, Sheraton-Cadillac Hotel, Detroit, Mich.

Dec. 21. New York Rubber Group, Xmas Party.

May 12-15, 1959. Division of Rubber Chemistry, A.C.S., Spring Meeting, Biltmore Hotel, Los Angeles, Calif.

Nov. 9-13, 1959. Joint International Meeting of Division of Rubber Chemistry, A.C.S.; Committee D-11, A.S.T.M., and Rubber and Plastics Division, A.S.M.E., Shoreham Hotel, Washington, D. C.

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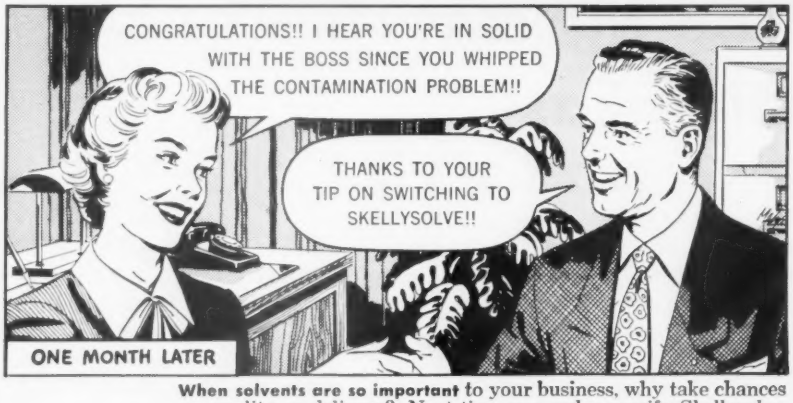
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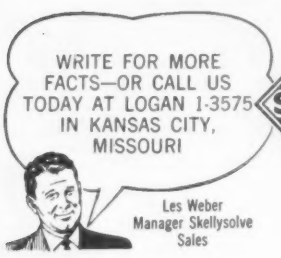

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Manager Skellysolve Sales

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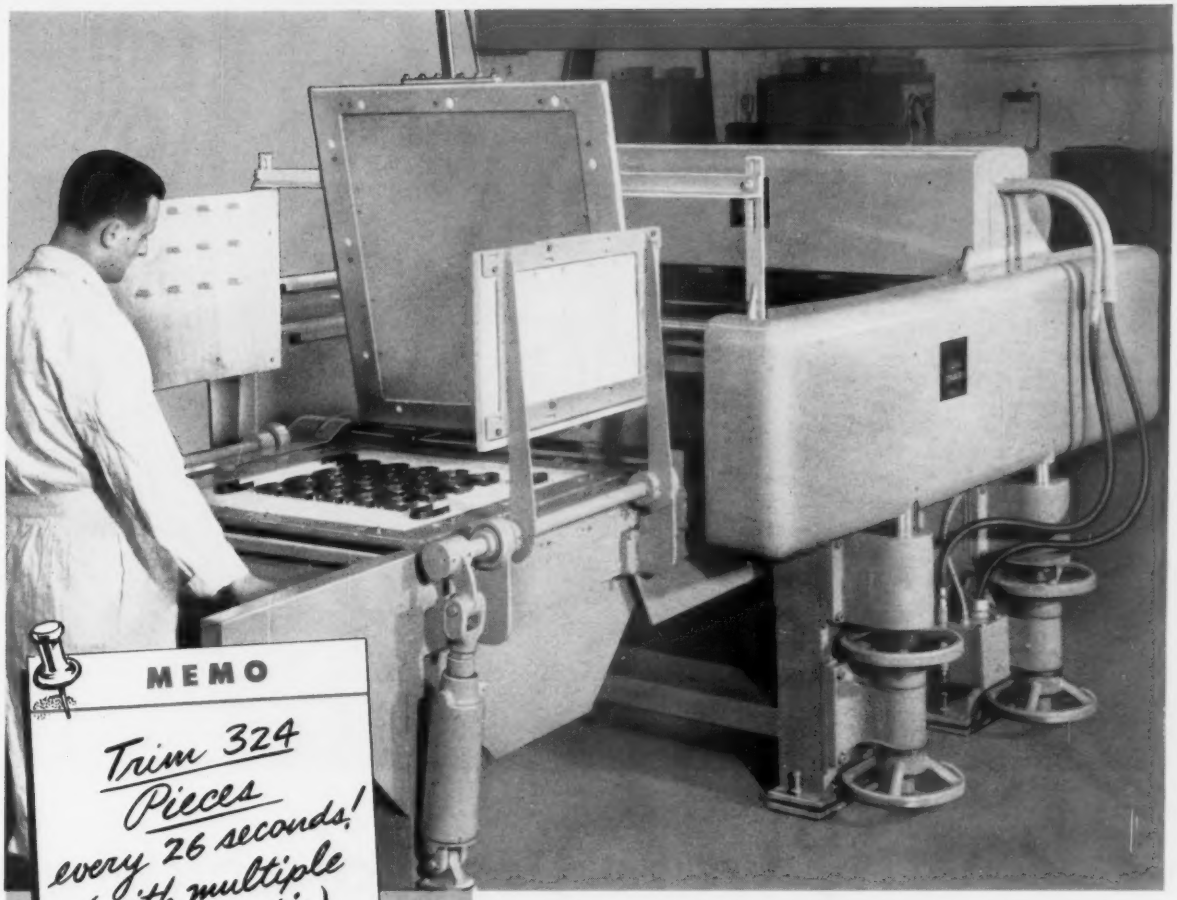

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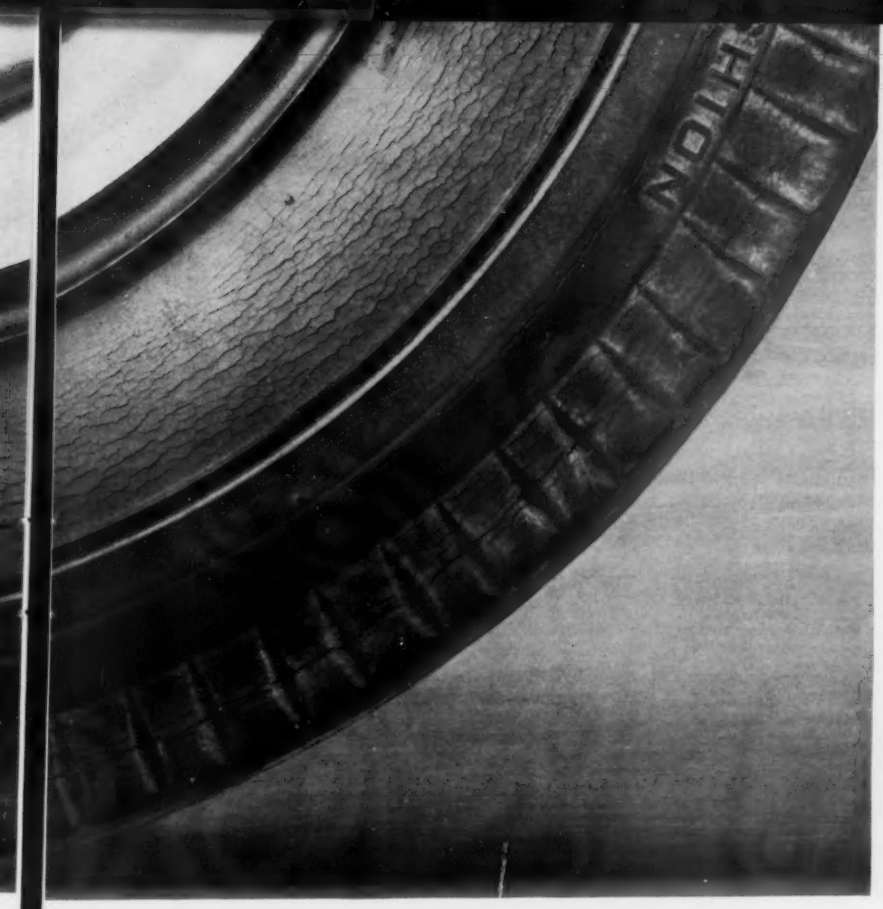
In Canada contact Du Pont Company of Canada (1956) Limited, Box 660, Montreal

Why were tires cracking in



Southern California?

THE premium-grade passenger tire shown in the upper unretouched photograph bears mute evidence of what has been an aggravating problem for Southern California motorists and tire retailers alike: sidewall cracks that ruin a tire's appearance and shorten its life long before the tread wears out.

The tire shown, for example, has only *30% tread wear*—yet the sidewall is already deeply cracked. The cause? *Ozone*—a form of oxygen that is especially destructive to ordinary rubber. While ozone is present everywhere, local atmospheric conditions permit it to accumulate in the air in abnormal amounts in Southern California. In such concentrations, ozone quickly destroys ordinary rubber products.

But this problem has now been solved. A leading tire manufacturer has developed a new type of premium tire that has already proved its ability to eliminate ozone crack failures. Retail sales records verify that customer complaints on ozone cracks have been eliminated.

The lower photograph (also unretouched) illustrates this fact. This tire was run approximately the same length of time as the cracked tire above. Notice how its sidewalls are free from cracks—how new it looks.

Basically, the big difference in these tires is that the new one has sidewalls made with *neoprene*—a Du Pont synthetic rubber whose resistance to ozone has been proved through years of use in many rubber products. With this background, the tire manufacturer felt neoprene was the answer—and it was!

A startling improvement in performance? Yes. But then, Du Pont has developed a *family* of synthetic rubbers just for that purpose. Neoprene offers a balanced combination of properties for many different uses. HYPALON* is the answer for many special causes of rubber failure. On the horizon is VITON*, a fluoroelastomer, which can withstand temperatures over 500° F.

E. I. du Pont de Nemours & Co. (Inc.), Elastomer Chemicals Department, Wilmington 98, Delaware.

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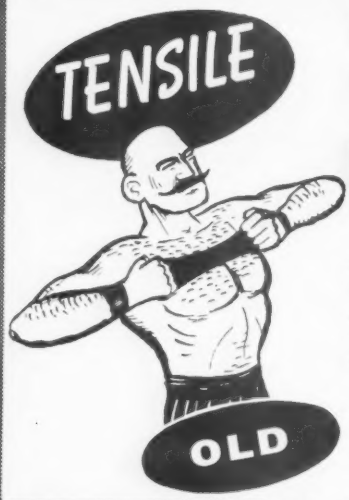
NEOPRENE

Better Things for Better Living
. . . through Chemistry

*Registered Du Pont Trademarks



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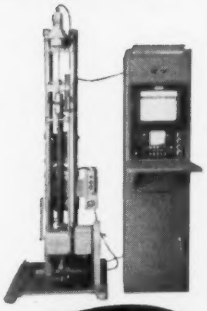
SCOTT TESTER* MODEL L-6

with "ACCR-O-METER"

This most modern Constant-Rate-of-Extension Tester incorporates an electric weighing system of unbelievable accuracy, widely variable speeds and infinite variety of loads up to 500 lbs. tensile. For tensile, tear, adhesion, etc. per

ASTM D412, D470

ISO and U. S. GOVT. Specs.



Write for data on Scott Model L-6 and other Testers

SCOTT TESTERS*

World-standard for testing elastomers in conformity with ASTM Specifications.

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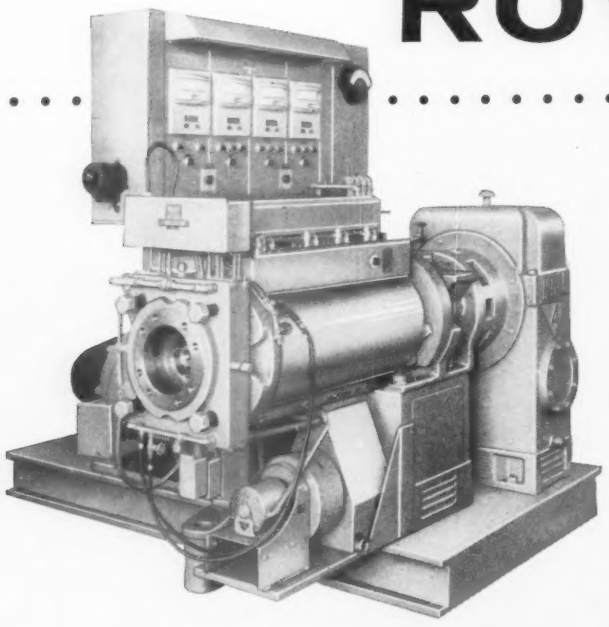
ROYLE

SPIROD® EXTRUDERS



These all electric extruders with radiant heat and high velocity evaporative cooling are designed to process either plastic or rubber compounds. The result of more than three quarters of a century of experience — Royle pioneered the extrusion process in 1880— in the design and construction of extruding machines time tested features have been built into Spirod to assure dependability.

Write for Bulletin #463

JOHN ROYLE & SONS

ROYLE PATERSON N. J. 1880

PIONEERED THE CONTINUOUS EXTRUSION PROCESS IN

London, England	Home Office	Akron, Ohio	Downey, Cal.	Tokyo, Japan
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Hyde Park 2430-0456	SHerwood 2-8262	BLackstone 3-9222	TOpaz 1-0371	(56) 2130-2149

NEW RUBBER SOLVENT INCREASES PRODUCTION WITH SHORTER DRYING TIME!

ESPESOL 165's
Narrow boiling range reduces handling time — improves quality of end product!

NEW ESPESOL 165 aliphatic solvent offers rubber processors a *narrow boiling range of 165 to 225 degrees F* with a low-odor factor. This narrow cut with its low end point offers a much shorter drying time and a substantial increase in production.

ESPESOL 165's higher initial boiling point offers less evaporation loss and permits greater solvent recovery. The solvent's unusually short distillation range offers two additional benefits: 1. Improved quality of end products. 2. Reduction in amount of solvent used.

Because the use of ESPESOL 165 can reduce handling time, increase production and improve the quality of your end products, this outstanding new solvent deserves the consideration of your organization. Send for the complete ESPESOL 165 story. Brochure containing characteristics and properties yours free on request. (No delivery problems! Eastern maintains adequate stocks of this unique product at all times.)

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New York Office: 10 Rockefeller Plaza, New York, N.Y., Phone Circle 7-2520
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Eastern States Petroleum & Chemical Corporation
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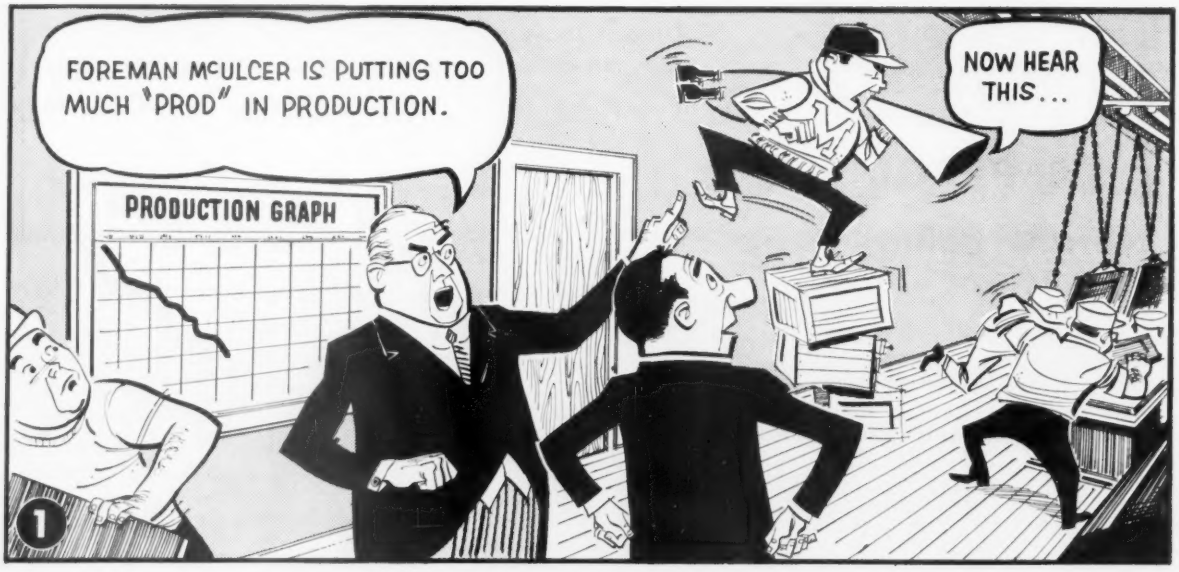
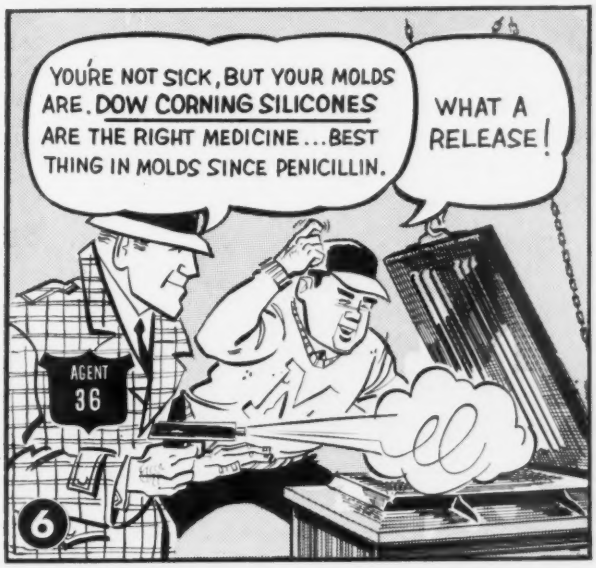
AGENT 36
SILICONE SQUAD

HOW I GAVE THE NEEDLE TO L.P.*

*LOST PRODUCTION

FROM THE OFFICIAL FILES OF DOW CORNING




YOU'RE NOT SICK, BUT YOUR MOLDS ARE. DOW CORNING SILICONES ARE THE RIGHT MEDICINE... BEST THING IN MOLDS SINCE PENICILLIN.
WHAT A RELEASE!
AGENT 36
6

SILICONES SPEED PRODUCTION, GIVE BETTER SURFACE DETAIL, QUICKER RELEASE, REDUCED SCRAP AND MOLD MAINTENANCE.
MY WORRIES ARE OVER.
AGENT 36
36 OR BUST
7

first in silicones

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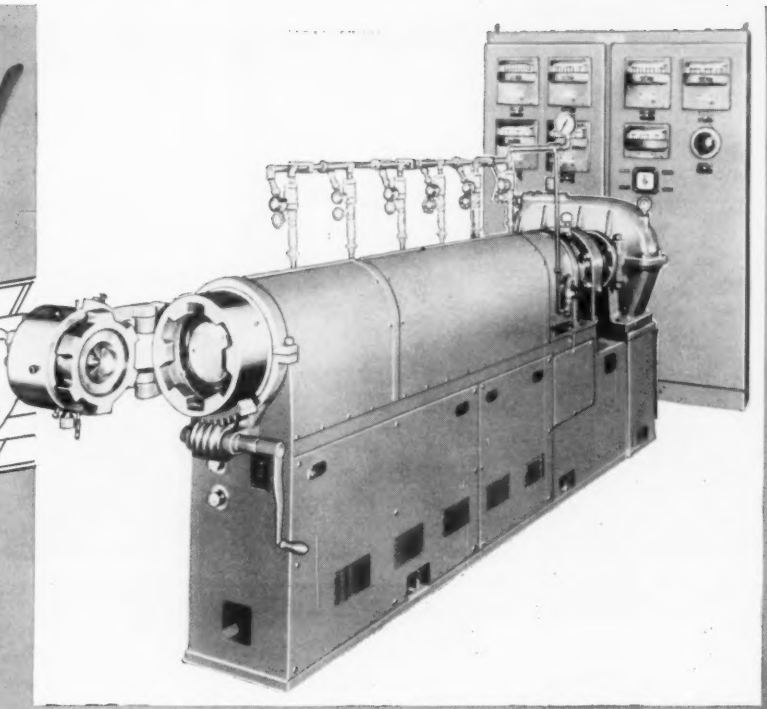
NEW!

HIGH PRESSURE

EXTRUDER



INDUCTION HEAT, with the Kullgren temperature control system, has these advantages: fast heat-up (to 400° in 20 minutes), low-cost operation at high temperatures, quick cooling, and "on-the-button" control.

HIGH PRESSURE screw and cylinder with all parts designed for long life at operating pressures up to 10,000 psi.

QUICK OPENING HEAD maintains a tight seal at the maximum pressures of 10,000 psi.

HIGH SPEED for increased production (150 rpm on a 3½-inch screw). All gearing and bearings designed for high-horsepower drives.

PRESSURE CONTROL by means of screw orifice can be adjusted continuously, manually or automatically, while running.

QUALITY ... better quality and increased production result from the use of CONTROLLED HIGH PRESSURE dies and extruders. New plastics coming on stream will emphasize the advantage of HIGH PRESSURE EXTRUSION.

Aetna-Standard is currently delivering high pressure induction-heated extruders and dies. These machines are available in all standard sizes in addition to the well-known line of standard extruders.

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HALE AND KULLGREN, INC. • AKRON, OHIO

AETNA ENGINEERING COMPANY
STANDARD
PITTSBURGH, PENNSYLVANIA

If the goal is better, lower-cost hard rubber goods and mechanicals —INDONEX Plasticizers

If you compound with natural rubber, reclaim, GR-S or neoprene or with combinations of the first three, you can get important benefits in both processing and finished product by using INDONEX Plasticizers. A series of highly aromatic, low-volatile hydrocarbons of medium to high viscosity, INDONEX Plasticizers may be used as softeners, processing aids or as extenders.

Here are six ways INDONEX Plasticizers can help you get product or process improvements. They:

1. Permit lower processing temperatures, improve dispersion.
2. Have no odor. Give off no objectionable fumes during compounding.
3. Give finished products improved elongation, tensile strength, resistance to flex cracking and tear, and low compression set characteristics.
4. Provide permanent elasticity and flexibility.
5. Control blooming in compounds with high loadings.
6. Allow high loadings while maintaining good physical properties and low cost.

More data about INDONEX Plasticizers is available. Inquiries will receive immediate attention.

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910 S. Michigan Ave.,
Chicago 80, Illinois

the definitive text for all who work with

rubber

SCOPE

With the objective of making available to the compounders of the rubber industry a working knowledge of reclaimed rubber, the members of the Rubber Reclaimers Association have published this "Manual of Reclaimed Rubber". Included are technical data, typical formulae (including specific gravity, costs and physical properties), types of reclaim available, names of suppliers, commercial uses and an appendix of general information. This valuable reference work, edited by John M. Ball, will be a welcome addition to any technical library.

94 Pages **$3.00**

CONTENTS

I—What is Reclaim?
II—Advantages of Reclaimed Rubber
III—Types of Reclaimed Rubber
IV—Compounding of Reclaimed Rubber
V—Commercial Uses of Reclaimed Rubber
VI—Appendix
VII—Index

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Please send me ——— copy(ies) of the "Manual of Reclaimed Rubber", @ $3.00 a copy.

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Name ———————————
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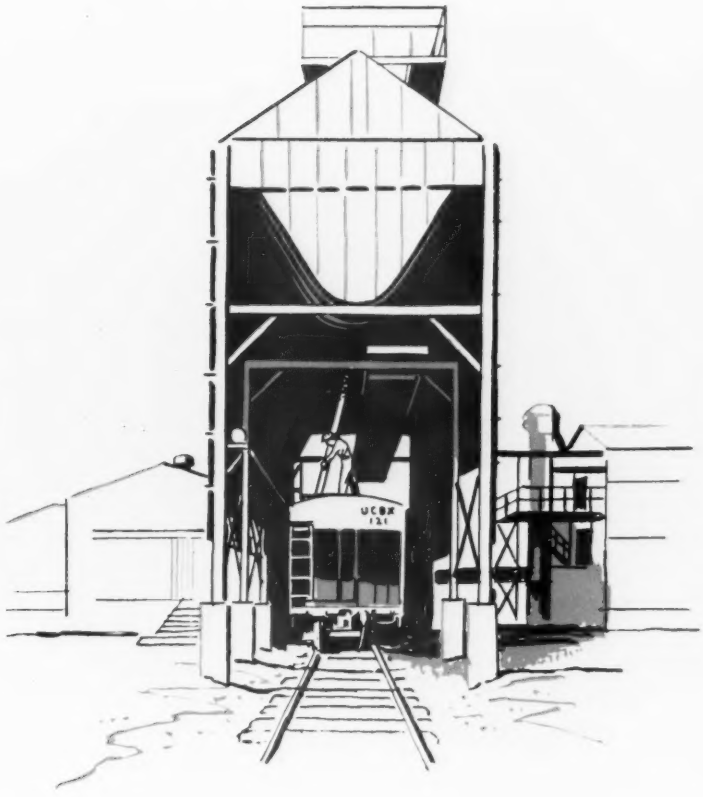
Add 3% for N.Y.C. addresses



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thirty-three years
devoted to the making
of superior carbon blacks
for all rubber needs

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For leadership in carbon black, compounders look to high abrasion furnace HAF black — **obviously Dixie 60,** the black with an unexcelled record for uniformity and high standard of quality.

DIXIE 60 satisfies from the very start with fast mixing, good dispersion, dependable extrusion, tight cure, outstanding reinforcement, high resistance to chunking, cracking, and abrasion, and enviable roadwear performance.

DIXIE 60 has all it takes to meet keen competition and the exacting demands of the rubber industry.

UNITED BLACKS have forged a name for themselves over the world. Standardize on **UNITED BLACKS** to achieve extra quality products.

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4 *reasons why permanently-attached couplings mean better service, bigger profits!*

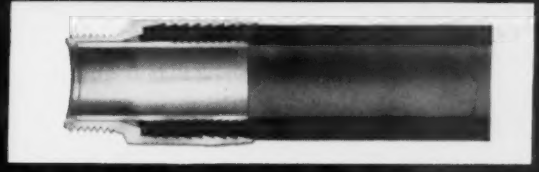
1 PERMANENTLY-ATTACHED HOSE COUPLINGS COST LESS than re-attachable couplings. Modern hose is of such good quality, lasts so long, by the time hose needs replacing so do re-attachable couplings.

2 CONTINUING ECONOMY WITH PERMANENTLY-ATTACHED COUPLINGS. You do away with hidden expenses involved in reconditioning re-attachable couplings. No time lost, less paper work, no shipping, etc.

3 MACHINE-ATTACHED FOR PRECISION FITTING AND FULL FLOW. You get a permanently fitted coupling every time . . . there's never a chance of possible costly damage to hose.

4 LEAK-PROOF WITH FULL-FLOW DIAMETER INSIDE. Scovill permanently-attached couplings are made from solid brass forgings with ductile copper-alloy flow tubes.

For gasoline-pump hose . . . permanently-attached hose couplings by **SCOVILL**



For complete specifications on gasoline-pump hose couplings, write to Scovill Manufacturing Co., Merchandise Division, 99 Mill St., Waterbury 20, Conn. Ask for Bulletin No. 570-H.

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Types, grades and blends for every purpose, wherever Vulcanized Vegetable Oil can be used in production of Rubber Goods—be they Synthetic, Natural, or Reclaimed.

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Akron, Boston, Chicago, Los Angeles, Trenton, Albertville, (Ala.), Denver

Overseas

By Comtel-Reuter

Milan—The Management Board of the Association of Italian Rubber Electric Cable and Allied Industries has issued a warning against the "unacceptable discrimination" in tariff duties between natural and synthetic rubber in the European common market and the free trade area. The Italians want to see the formation of a European body for collaboration in the rubber industry.

Kuala Lumpur—Rubber traders are opposed to a proposal by the president of the Penang Rubber Trade Association for the formation of a Far Eastern Rubber Council to protect the interests of rubber producing countries against synthetic rubber competition. They said such a move was not practicable without the backing of the governments concerned.

Manila—Philippine tire production in 1958 should show a substantial increase over the 275,000 truck and motor car tires turned out in 1957, according to tire company officials. Philippine government officials have urged farmers in the northern island of Mindanao to plant rubber trees in order to expand the country's new rubber industry.

Rio de Janeiro—Major tire companies in Brazil are reported to be working on a hand to mouth basis because of the shortage of supplies of natural rubber. Emergency measures to maintain production have included flying in rubber from the Amazon while small quantities have been brought in by sea. These supplies are sufficient to fill only a few days' needs at a time.

Singapore—The use of research funds for the rubber industry has been criticized by Sir John Hay, chairman of Guthrie & Co., who has completed a six-week tour of Malaya. He stated that funds to improve the quality of natural rubber have been "frittered away in an ill-directed and extravagant manner."

Madrid—Spanish Firestone, Firestone Hispania SA, has applied for permission from the Ministry of Industry to use 108,540,000 pesetas of its funds for extensions to its tire factory at Basauri near Bilbao. The approximate value of machinery to be imported is 20,259,000 pesetas and the production target is 378,000 tires annually.

Bangkok—Thailand's rubber exports are expected to touch a new low this year, due to the general situation in the rubber trade, a Thai government official has disclosed.

in high temperature processing...

Get maximum freedom from scorch with

'Sharples' brand

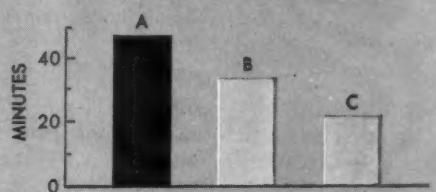
DIPAC®

Diisopropyl Benzothiazyl-2-Sulfenamide

BASE COMPOUND

Smoked sheets	100.00
ISAF black	50.00
Zinc oxide	5.00
Stearic acid	3.00
Plasticizer	3.00
Anti-oxidant	1.00
Sulfur	2.25

MOONEY SCORCH—T-5 @ 248°F.



A. 0.50 DIPAC
B. 0.50 cyclohexyl sulfenamide
C. 0.80 benzothiazyl disulfide

Here is a delayed-action accelerator that is especially suited to modern high temperature processing equipment. DIPAC provides an outstanding combination of long scorch time and good cure time, even in "difficult" compounds such as natural rubber stocks loaded with fast-curing furnace blacks.

Optimum cure time of DIPAC compounds compares closely with that of compounds using other sulfenamide accelerators. The general physical properties and aging characteristics of DIPAC compounds are essentially the same as those obtained with other thiazoles and sulfenamides.

Technical data and performance comparisons on DIPAC are given in our Bulletin S-121B . . . including studies on GR-S 1500 with HAF Black and GR-S 1712 with ISAF Black, as well as on smoked sheet rubber with ISAF Black. To get your copy . . . and a sample of DIPAC for your evaluation . . . just write or call Pennsalt.

See our Catalog in CMC

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ESTABLISHED 1850®

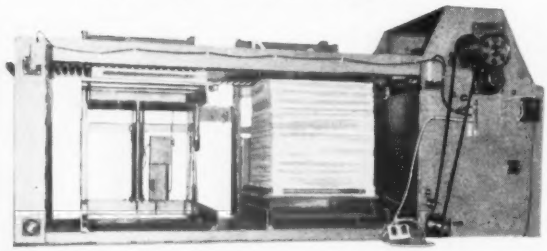
INCREASE PRODUCTION . . . DECREASE COSTS

With

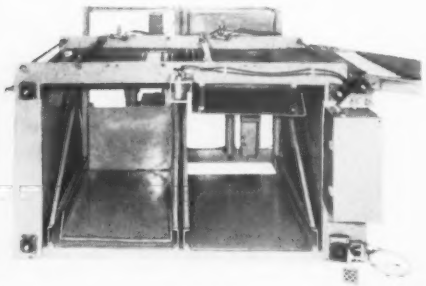
ALFA

Automatic

Cutting and Stacking Units

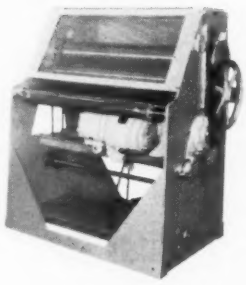


These highly efficient machines are furnished separately or as a complete self-contained unit for automatic cutting and stacking of materials from extruders, mills, calenders, and other processing lines. The Rotary Cutter is complete with a variable drive for automatic synchronization to the material speed, and length of cut can be easily and infinitely adjusted within the given range. Alfa Stackers are available with single or double stacking units. They accommodate a wide variety of materials and stack on lowering skids that are easily handled by fork truck.



CUTTING and STACKING FEATURES . . .

- Blades easily adjusted to micrometer exactness
- Cuts and stacks at speeds up to and exceeding 100 ft./min.
- Handles material widths from 24" to 50"
- Cuts lengths from 24" to 60"
- Stack per skid 40" high, max. skid load 4000#



REPRESENTATIVES FOR ALFA MACHINE CO.

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OVERSEAS (CONT'D)

Moscow—A new type of synthetic rubber is being produced on an industrial scale at the synthetic rubber works in Voronyezh and at Sumgait, near Baku. Utilizing a new process in which mineral oil grease is used as a component, it is hoped that eventually the new development will make it possible to save about 250,000 tons of grain annually as a result of reduced consumption of ethylene alcohol.

Port Moresby—A project to encourage the use of the best overseas strains of rubber in Papua is expected to boost yields in the territory. The plan involves the growing in nursery plots of high-yielding, proven clones imported from Malaya and Ceylon.

Karachi—Japan will not send her ships to Indonesia to bridge the gap created by the suspension of Dutch shipping lines. Japanese owners are not prepared to take risks at present in view of the prevailing political conditions in Indonesia.

Duesseldorf—The synthetic rubber plant being built by the Bunawerke Huels Co. is expected to start production in May, at an annual rate of between 45,000 and 50,000 tons, industry sources disclose. The company will produce synthetic cold rubber which will be marketed under the name "Buna Huels K".

Singapore—Malaya's 320,000 plantation workers were to have taken a daily wage cut of 30 Malayan cents effective April 1, because of the system of pegging wages to the price of the preceding quarter. The union rubber workers stated that the agreement which would authorize the cut was now terminated, but an employers' spokesman said it would remain in force until a new one was negotiated.

Dublin—Irish Dunlop Co. has announced a five per cent reduction in car, commercial vehicle, motor cycle, cycle, tractor and industrial tire and tube retail prices. Dunlop factory retreads have also been reduced by five per cent.

Colombo—Ceylon and the Soviet Union have signed an economic and technical cooperation agreement which, among other things, will give Ceylon long term credits of up to 142,000,000 rupees. These credits will enable Ceylon to buy machinery from Russia for her development program, which includes provision for the establishment of a factory for motor car tires and tubes.

London—The War Risks Rating Committee of the London Institute of Underwriters has announced that war and strike, riot and civil commotion shipping risks for voyages to, from, or between ports in Indonesia and/or Dutch New Guinea are "held covered". This means that cargoes can be insured but that there is no fixed rate.

The lighter side of rubber and plastics . . . colorwise, of course . . . is achieved through TITANOX* white pigments: TITANOX-RA, TITANOX-RA-50, and TITANOX-RA-NC (rutile titanium dioxides), and, for certain rubber compounds such as white sidewall stocks, TITANOX-AMO (anatase titanium dioxide).

Here's why: these leading white pigments lighten and opacify colors, whiten and opacify white stocks, regulate translucency or opacity, and contribute to durability. In addition, they lighten the burden of processing through ease of dispersion and uniformity of all properties. Titanium Pigment Corporation, 111 Broadway, New York 6, N. Y.; offices and warehouses in principal cities.

5721-A

TITANIUM PIGMENT CORPORATION

Subsidiary of **NATIONAL LEAD COMPANY**

*TITANOX is a registered trademark for the full line of titanium pigments offered by Titanium Pigment Corporation.

RUBBER AGE

the rubber field's foremost publication

The Responsibility of Leadership

A leader is, among several other things, that one individual or organization showing a **willingness** to give just a little more than the rest.

RUBBER AGE, with an already impressive list of editorial "firsts" to its credit, announces another of major importance to readers and advertisers alike!

Mills Shepard, Inc., has been retained to conduct readership studies of RUBBER AGE during 1958.

Mills Shepard, Inc., uses a continuing, rapid means of reader identification and evaluation to study and gauge editorial and advertising effectiveness. Initially, four 1958 issues of RUBBER AGE will be studied:

JANUARY APRIL JULY OCTOBER

The results of these studies, supplementing our own program of editorial research and evaluation, will be used by our editors as significant tools in maintaining the editorial superiority that readers have come to expect from RUBBER AGE.

Thus, RUBBER AGE once again displays its willingness to accept the responsibilities of leadership.

RUBBER AGE

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New York 1, N. Y.

ABP

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Also Publishers of the Industry's only Directory
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FOR EVERY RUBBER COMPOUNDER

POLYMEL

C-130

A solid friable copolymer resin effective in highly-loaded GR-S and natural rubber stocks

STAINLESS PLASTICIZER

INCREASES FLEX-CRACK GROWTH RESISTANCE

INCREASES SHORE HARDNESS

MAINTAINS ABRASION RESISTANCE

INCORPORATES RAPIDLY

PROPERTIES

Physical Appearance	Friable, Solid
Color	Light Amber
Odor	Characteristic
Specific Gravity	1.03
Melting Point	208 - 210 F.
Chemical Reaction	None Apparent

PRICES

$.1475	Truckload
.1575	Less than Carload

F.O.B. BALTIMORE, MARYLAND

MANUFACTURERS OF

Compounding ingredients for Reinforcing, Plasticizing, Extending and Processing Natural and Synthetic Elastomers.

The following chart is a nuclear batch compound showing the amount of POLYMEL C-130 necessary for a more efficient finished Vulcanizate.

POLYMEL C-130

	B6	B8
GR-S 1502	70	70
High Styrene Co-Polymer	30	30
POLYMEL C-130	—	10
Zeolex	40	40
Zinc Oxide	5	5
Heavy Mag. Oxide	5	5
D.P.G.	0.5	0.5
Santocure	1.25	1.25
Neozone D	1	1
Sulphur	3	3
TOTAL	155.75	165.75

TENSILE — (T) % ELONGATION — (E)

325° F.	T	E	T	E
5 Min.	1300	230	1250	280
10 Min.	1340	210	1210	260
20 Min	1290	180	1200	220

MODULUS at 200%

5 Min.	1200	970
10 Min.	1260	1070
20 Min.	—	1150

SHORE HARDNESS

5 Min.	90	94
10 Min.	90	94
20 Min.	90	94

PERMANENT SET

5 Min.	42½	60
10 Min.	40	50
20 Min.	35	40

CURE 15 MINUTES AT 325° F.

Flex Resistance	170,000 (Failed)	3 mm at 731,000 (Removed)
Abrasion Resistance B. of S.	24.5	24.8

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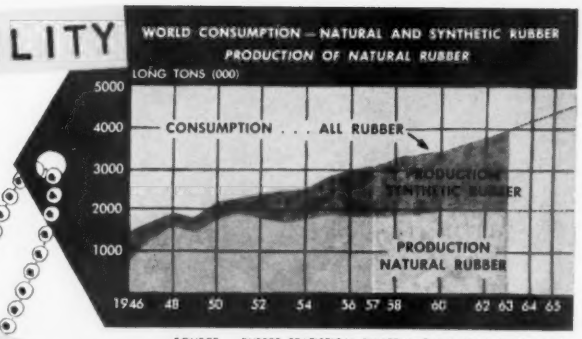

SOURCE . . . RUBBER STATISTICAL BULLETIN, R.M.A. STATISTICAL COM.

Former giant Government development and test center is now exploring new uses for synthetic rubbers to aid industry in product improvement through use of product-specialized synthetics.

Industry predicts that total synthetic rubber production and consumption will double by 1963 to meet the world's total rubber requirements. The recent purchase of the world's largest synthetic rubber laboratory and pilot plant by the Firestone Tire & Rubber Company again emphasizes Firestone's continuing interest in the solution of the problems of the rubber industry.

Firestone, world's leading supplier of natural and synthetic rubbers, thus adds to its already vast facilities for polymer research, production and product-application testing.

Firestone will use this facility entirely for new polymer research and development, and to supplement its customers' own laboratory, processing and testing work. This expansion makes possible closer coordination of efforts between Firestone and end product manufacturer's personnel and should result in lower product development and improvement costs for industry.

Other major advantages of the new facility to manufacturers are Firestone's increased abilities to solve product improvement problems, to assist in planning new products, and to find new ways to put the capabilities of synthetic rubbers to work in homes and in industry.

Synthetic rubber is replacing natural rubber in today's economy. We invite you to find out how this facility can work for you. Call or write *Firestone Techni-Service*, FIRESTONE SYNTHETIC RUBBER and Latex Division of The Firestone Tire & Rubber Company, Akron 1, Ohio.

Firestone

BETTER RUBBER FROM START TO FINISH

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Capitol Cues

THERE'LL BE MORE BAD NEWS ABOUT BUSINESS before things get better. That's the conviction of most of the economists who have expressed opinions. They're not gloomily prophesying a prolonged downswing, either; in fact, they see an upturn before the end of the year—in the late Summer or early Fall.

Some of the minus signs you'll be seeing in between:

- Unemployment will hold close to the 5 million level during the rest of the Spring and shoot above that figure in June.
- Factory output--down 9% since Summer—will fall some more.
- Business outlays for new plant and equipment—latest surveys show—will keep declining quarter by quarter through 1958.
- Retail sales...especially hard goods...will slip as consumer buying power shrinks. Autos will probably suffer the most.

By contrast, the good news will be fairly sparse. There may be some rise in home-building as mortgage money gets easier. And defense ordering will be increasing...to be felt by Fall.

THE STORY BEHIND THE OPTIMISTIC TALK about business that came out of the White House during the past month or so is partly political, partly economic, and partly semantic—a question of words. Politically, no party likes to admit to a recession while in power. Economically, a President's words can have much influence on consumer and industry decisions to spend.

As for the semantics, those predicting the start of an upturn any day are "accentuating the positive." Faint harbingers of recovery may appear soon. But it will be months before they show up in increased consumer incomes or business sales. For all practical planning, things won't be improving till Fall.

THE WAGE-PRICE SPIRAL WILL GO ON all during 1958 though business has been declining for several months. Economists in government and in industry now accept this as a certainty. This may not jibe with long-held theories of what's supposed to happen in a downturn. But the trend has become clear.

All of the pressures now at work are operating to lift prices and wages. The current business downswing has weakened these pressures a little. But it certainly hasn't stopped them.

RISES IN PRICE INDEXES WILL BE SUBSTANTIAL this year, in the opinion of price specialists. Indeed, the increases foreseen will come fairly close to the truly inflationary gains of '57. In the last month, the experts have had to revise estimates upward. Here are some of the factors responsible:

- Higher unit costs, resulting from declines in production.
- Rising freight rates—2% so far in '58, with more to come.
- Sizable wage hikes, which will boost steel about 4% in '58.
- Weather damage to crops, which has sent food costs soaring.

Now, here's what these factors will do to the Indexes:

- The Consumer Price Index will be up close to 2%, January to December, as against a 3.4% rise in 1957. Besides food there will be hikes in rents, utilities, fares, transportation, etc.
- The Wholesale Price Index will be up 1%—mostly in the last half. Steel, freight, nonferrous metals and meats will lead.

Continued on Next Page

NEGOTIATIONS IN AUTOS FORESHADOW BIG WAGE HIKES for other industry, according to analysts in close touch with both sides at Detroit. They now are revising their predictions on wage hikes...upward. In the process of hammering out an agreement this Summer, there could be a strike. In fact, the labor experts say that the times have rarely been as ripe for a walkout.

> The union is dead set on getting big pay hikes this year. It claims it must catch up with past rises in living costs and productivity. In all, its demands would cost 30-40¢ an hour. And union head Reuther wants a profit-sharing system set up.
>
> The makers will take a strike before they'll agree to profit-sharing. And they won't let labor costs go up 15%-20% when sales are so slow. Anyway, dealer inventories are at record levels. So, a moderately long shutdown wouldn't cost sales.
>
> •What are the odds on a strike? Right now, about even money.
> •Who would be struck? Most likely GM, or all the Big Three.
> •How long would it last? Probably about three to six weeks.
> •How big a settlement? 15¢ an hour (6%)—NO profit sharing.
> (Note that this will become the target for other unions.)

CORPORATE PROFITS IN 1958 MAY BE THE LOWEST of the last five years. They have already begun to slide; in the last quarter of '57, they were 8% below the comparable period of 1956. And they are shrinking some more now. Rising costs are cutting into margins, while competition for sales is keen.

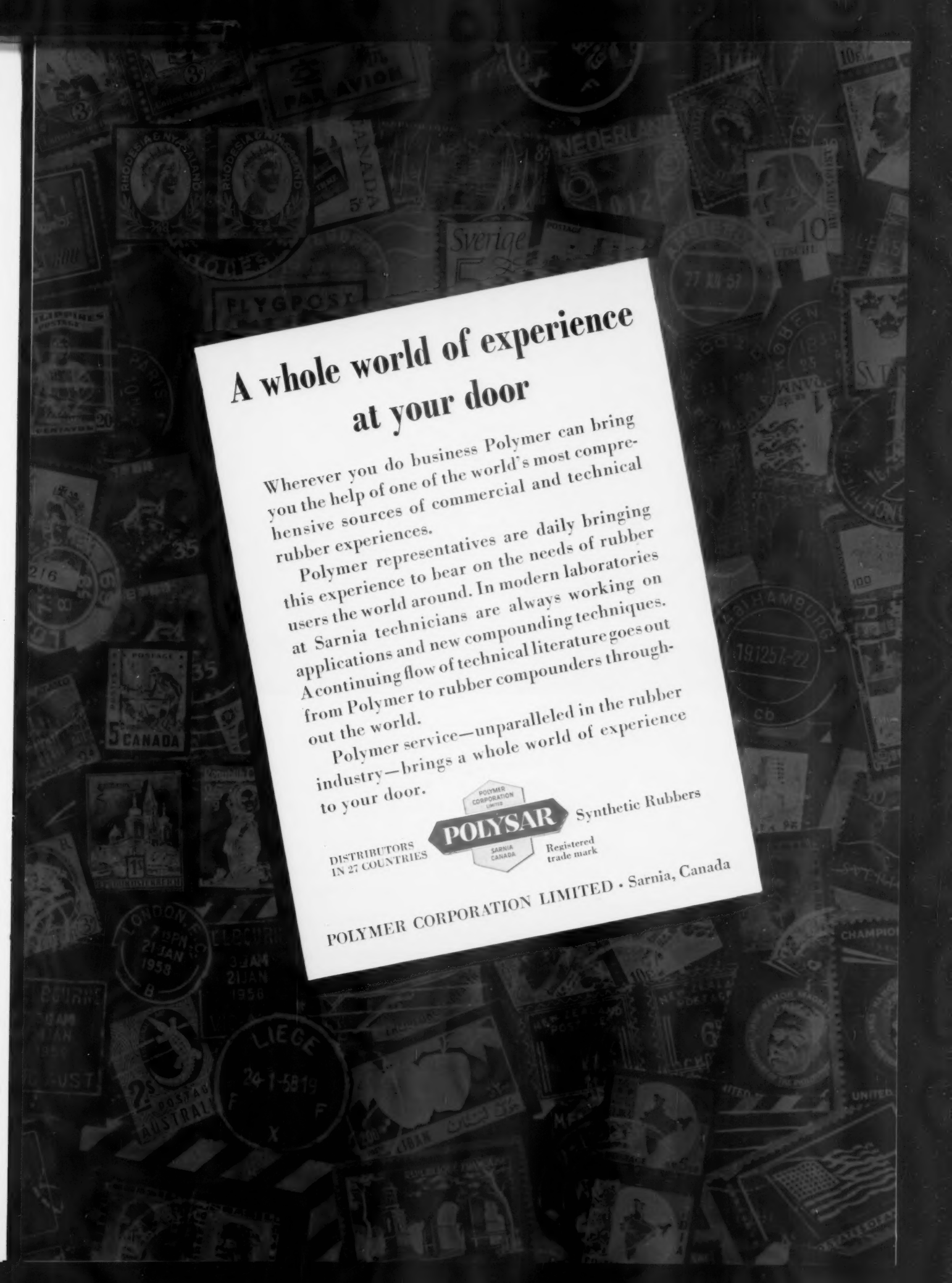
> For all last year, earnings came close to $42 billion, off 2% from 1956. This year, net won't hit $38 billion. Industries likely to do best are utilities, finance, foods, and drugs. Biggest dips will come for rails, oil, metals, and machinery.

THE PRESENT STEEP SLIDE IN U.S. EXPORTS COULD SPEED quite a little, if business activity in this country doesn't turn around before very long. Easing in the U.S. inevitably brings a cut in imports...what we buy abroad. That leaves our foreign customers with fewer dollars for buying goods here. So measures to reduce buying from the U.S. may be clamped on late in 1958.

> These steps might include higher tariffs, import quotas, and exchange curbs. Thus, the 15% export dip—forecast earlier for this year—may prove too mild. Watch for Russia to try to grab some of our old markets, by buying goods we don't.

WHAT KIND OF TAX CUT IS LIKELY TO BE VOTED if need becomes clear—that is, if business does not turn up right away? The President and most of his advisers favor across-the-board cuts—say, about 5% for everyone. This would mean $4 billion a year more for taxpayers, with biggest savings going to the upper brackets. Eisenhower might also suggest a slight cut in rate on corporations—from 52% to 50%. In the past, such cuts spurred investment.

> Democrats are out to "help the little man" with cuts that are politically popular—raising exemptions from $600 per person to $700, or halving the 20% rate on the first $1,000 of net. At the moment, they seem to have the votes to get their way.



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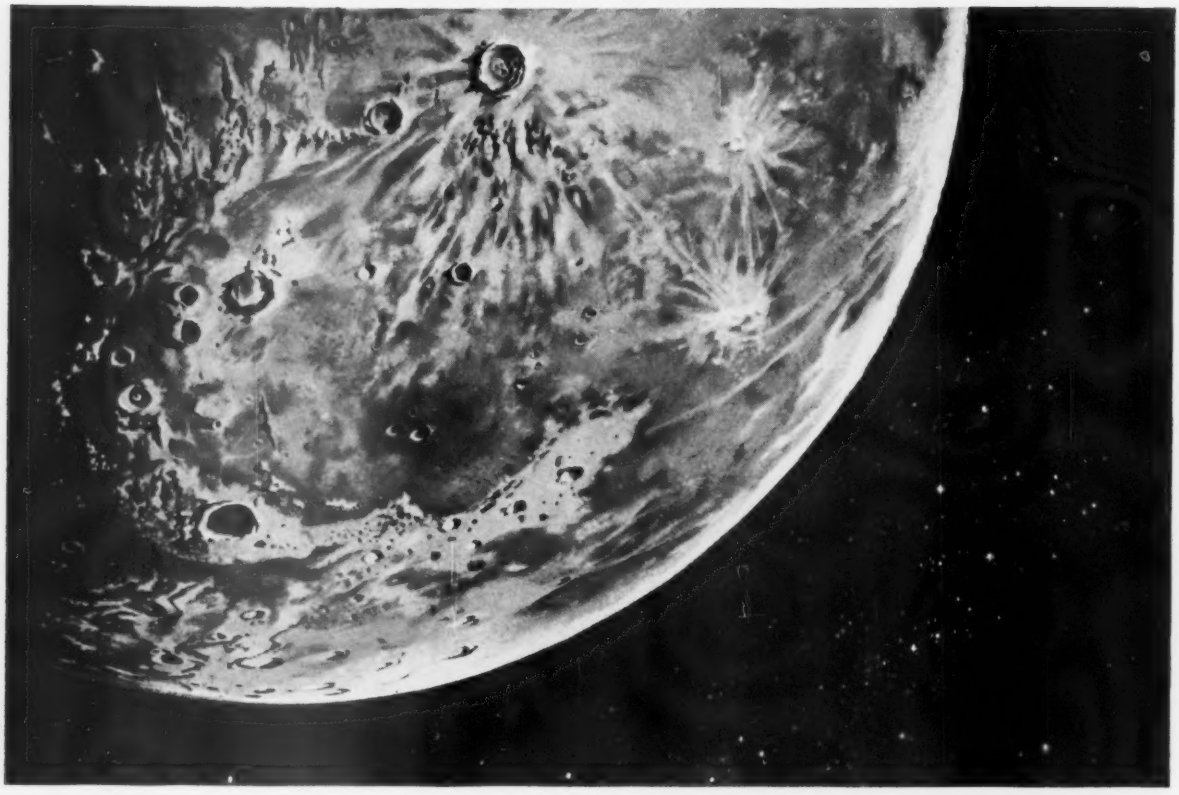

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Rubber Age

Vol. 83, No. 1 April, 1958

By M. B. NEUWORTH*
*Pitt-Consol Chemical Co., Newark, N. J.***

An Evaluation of New Mercaptan Type Chemical Peptizers

Performances of two mercaptan rubber peptizers based on new raw material sources

MILLING or mastication is the only practical method of reducing the molecular weight of raw rubber to a level at which it may be easily processed. Undesirable side reactions accompany long time milling and exert a deteriorating action on the rubber. It is common practice to add substances which improve the efficiency of breakdown and reduce milling time.

Synthetic aromatic mercaptans, particularly thioxylenol, pentachloro thiophenol and their zinc salts, have been used commercially for chemical plastication of natural and synthetic rubber. Their acceptance is based on their efficiency at low concentrations. The use of these agents permits short milling times over the normal range of operating temperatures. In addition, the cure or aging properties of the rubber are not affected.

Commercial quantities of thiocresols and thioxylenols have become available as a result of a new refining process installed at the Newark plant of Pitt-Consol Chemical Co. The availability of these materials led us to investigate their use as rubber peptizers.

A laboratory evaluation of samples of refined thiocresols and thioxylenols as chemical peptizers for natural rubber, GR-S 1500, GR-S 1000, and GR-S 1712 is presented in this paper. The performance of these materials is compared with two commercial synthetic mercaptan chemical peptizers. A factory evaluation of the refined thioxylenols for plasticizing natural rubber is included in comparison with a commercial thioxylenol peptizer. In addition, the effect of refined thiocresols and thioxylenols on the rate of cure and aging of natural rubber tread stock is compared with the two commercial chemical peptizers.

* Address: Pitt-Consol Chemical Co., P. O. Box 501, Library, Penna.
** Subsidiary of Pittsburgh Consolidated Coal Co.

Experimental Procedure

Chemical peptizer A is a commercial product described as thioxylenols dissolved in hydrocarbon solvent.

Chemical peptizer B is a commercial product described as the metallic salt of a chlorinated thiophenol.

Peptizer 620 (Pitt-Consol Chemical Co.) is a hydrocarbon solution of thiocresol with a thiocresol concentration of 40% minimum.

Peptizer 640 (Pitt-Consol Chemical Co.) is a hydro-

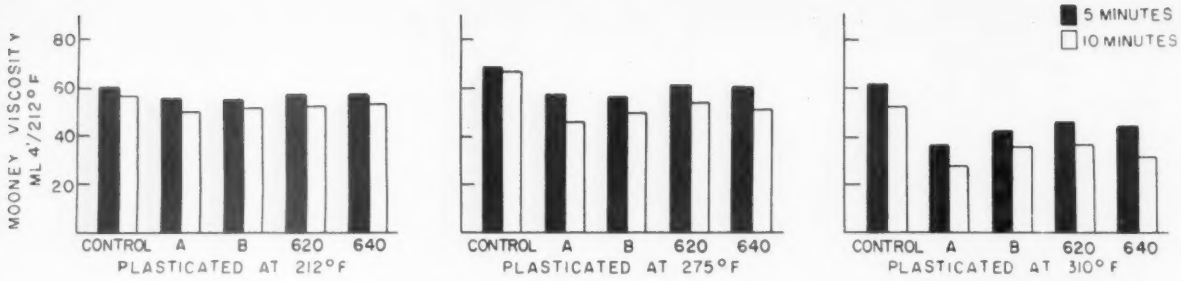

FIG. 1—Plastication of natural rubber.

carbon solution of thioxylenol with a thioxylenol concentration of 40% minimum.

The concentration of the two commercial peptizers used for plasticizing a particular type of rubber was adjusted to an equal cost basis based on prices in the spring of 1957.

The laboratory evaluation was carried out using a laboratory mill. The mill roll surface temperature was adjusted to a specified value before starting a series of mixes and regulated to maintain surface temperature during the breakdown cycle. The rubber was bonded on the mill before the peptizer was added, which required two minutes. The plasticating times started with the addition of peptizers. Each batch was cut the same number of times and blended uniformly. The mill gauge was accurately controlled so all batches were mixed exactly the same. The rubber was sheeted off and held for 24 hours before determining Mooney plasticity, tested in accordance with ASTM D-927-52T. All laboratory data were obtained by an independent consulting laboratory.

Results with Natural Rubber

The plastication of a sample of natural rubber using Peptizers A, B, 620 and 640 was studied at three temperature levels: 212°, 275° and 310°F. Mix times of five and ten minute periods were used. A control containing no peptizer was included for each change of conditions. The results are shown in Figure 1. The concentration of Peptizers A, 620 and 640 was 0.1%, Peptizer B being adjusted to 0.075%.

At 212° F. a mix time of ten minutes is required to obtain significant reduction in Mooney. The four peptizers are about equal in potency. At 275°F. and a mix time of five minutes, Peptizers A and B are both somewhat more effective in reducing Mooney than either Peptizers 620 or 640. At a 10-minute mix time, Peptizer 640 becomes equal to Peptizer B and slightly less effective than Peptizer A. Of the four materials, Peptizer 620 shows the least reduction in Mooney. At 310°F. and a 5-minute mix time, the four materials show about the same order of activity. With a 10-minute mix time, Peptizer 640 results in a greater reduction in Mooney than Peptizer B, approaching Peptizer A in activity.

A similar study was made on a sample of tough smoked sheet. Since Peptizer A was superior to Peptizer B under all conditions covered, Peptizer B was excluded from this evaluation. The results are shown in Figure 2. At 275°F. and a five-minute mix time, the Mooney plasticity value of the control of 83 is reduced to values of 53.0, 60.5 and 58.0, respectively, for Peptizer B, Peptizer 620 and Peptizer 640. The three materials all show effective plastication. Increasing the mix time to ten minutes resulted in a further reduction in Mooney values of 41.5, 51.0 and 47.5, respectively. A similar series was run at 310°F., showing about the same results except the three materials approached each other more closely in activity. The results indicate that Peptizer 640 is somewhat more potent than 620 in natural rubber.

Since differences in the performance of peptizers observed in laboratory testing are not always duplicated in factory testing, a comparison of the performance of Peptizer A and Peptizer 640 was made at the factory level.

A batch of smoked sheet exceeding 4000 pounds was divided into six batches of equal weight. Two batches served as controls without the addition of any peptizers. Two batches were plasticized with Peptizer A at 0.1%

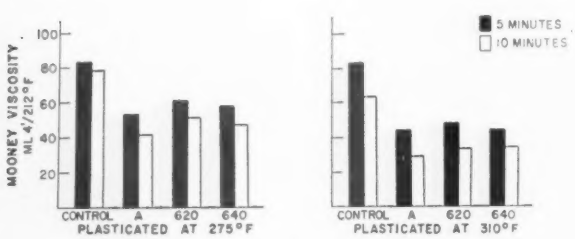

FIG. 2—Plastication of tough smoked sheet.

TABLE I—FACTORY EVALUATION OF PEPTIZER A AND PEPTIZER 640

	Control	Peptizer A	Peptizer 640
Dump Temperature, °F.			
1st Run	275	280	310
2nd Run	300	310	300
Mooney Plasticity ML—4 min./212°F.			
High	81	60	60
Low	77	55	54
Average	79	57	57
Williams Plasticity/Recovery (ASTM D-926-47F)			
High	3.70/0.35	3.05/0.20	3.05/0.20
Low	3.60/0.30	2.80/0.10	2.85/0.15
Average	3.65/0.33	2.91/0.15	2.94/0.16

TABLE II—EFFECT OF PEPTIZERS ON PHYSICAL PROPERTIES OF UNAGED AND AGED SAMPLES

	300%	500%	Tensile	% Elong.	% Set	Shore Hardness
UNAGED SAMPLES*						
Control	1060	2490	3955	660	48	62
Peptizer A	1080	2495	3920	660	50	62
Peptizer B	1110	2555	3870	645	50	62
Peptizer 620	1080	2485	4085	675	50	61
Peptizer 640	1080	2480	3930	660	48	61
OXYGEN BOMB AGED SAMPLES* (ASTM D-572-48, 72 hours at 70°C., 300 psi oxygen)						
Control	1155	2205	2590	575	59	64
Peptizer A	1180	2170	2555	570	57	65
Peptizer B	1260	2425	2715	555	53	65
Peptizer 620	1175	2205	2645	590	60	65
Peptizer 640	1215	2245	2540	555	53	65

* Average of 30, 45, 60 and 90 minute cures.

concentration. The final two batches were plasticized with Peptizer 640 at 0.1%. Processing was carried out in a No. 27 Banbury. Total Banbury cycle was eleven minutes with the peptizer being added with the rubber at the start of the cycle.

The range of dump temperatures observed following mastication are indicated in Table I. In addition, the Mooney plasticity, Williams plasticity and recovery numbers are shown. Each mill batch was sampled separately for test, making a total of four tests on each rubber. The high, low and average values are presented in order to obtain a more detailed picture of the spread in experimental plasticity values.

The high activity of both plasticizers is clearly indicated in the reduction in Mooney plasticity from 79 for the control to 57. The Williams plasticity and recovery indicate the same result. The plasticity values obtained for rubber batches treated with either plasticizer are essentially identical within the experimental error indicating equal performance on a factory basis.

The effect of the four peptizers, including the two commercial peptizers, on the physicals before and after aging of a natural rubber tread stock was determined. The test formula used was as follows:

Natural rubber	100.00
Stearic acid	3.00
Zinc oxide	5.00
EPC black	45.00
Pine tar oil	2.00
Sulfur	3.00
MBT	0.65
PBNA	0.75

Peptizers A, 620 and 640 were added in a concentration of 0.4% based on rubber hydrocarbon. Peptizer B was used in a concentration of 0.3%. The higher concentrations were used to highlight any deleterious effects. A control containing no peptizer was used for comparison.

The Mooney scorch for the control was 20 minutes. Stocks containing peptizers gave values within two minutes of the control, indicating little effect on scorch. A plot was made of the unaged T-50 data to determine

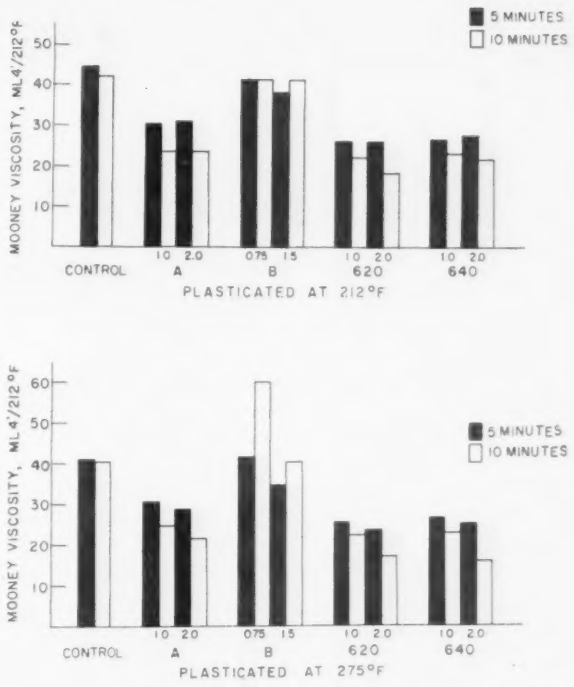

FIG. 3—Plastication of GR-S 1500.

the effect of the peptizers on the rate of cure. The control stock reaches a T-50 of —1.00°C. in 45 minutes. The four plasticizers reach the same T-50 within 47 to 48 minutes, which is within experimental error. A comparison of the physicals for the control of plasticized stock indicates the peptizers have no effect on the physical properties of the unaged stock.

Each stock was aged in an oxygen bomb for 72 hours at 300 psi of oxygen and 70°C. The physicals were redetermined. The physicals before and after oxygen bomb aging are presented in Table II. The results in general show that the plasticizers have no effect on the aging qualities of the rubber stock as compared with the control.

Results with Synthetic Rubber

The evaluation was extended to include the performance of the four peptizers in three types of synthetic rubber. Higher concentrations of plasticizer are required in synthetic rubber to produce the desired plastication.

The effect of concentration and milling time for the four peptizers in GR-S 1500 at 212° and 275°F., respectively, is shown in Figure 3. A control containing no peptizer was included. Peptizers A, 620 and 640 all show desired activity in concentrations of 1% and 2% in promoting breakdown of GR-S 1500 at 212°F., with milling times of five and ten minutes.

Peptizers 620 and 640 appear to be slightly more efficient than Peptizer A. Peptizer B at concentrations of 0.75 and 1.5% is completely inert, producing about the same breakdown as the control. At 275°F. the results are about the same as 212°F. Peptizers 620 and 640 again appear slightly more potent than Peptizer A.

A similar evaluation was carried out on a sample of

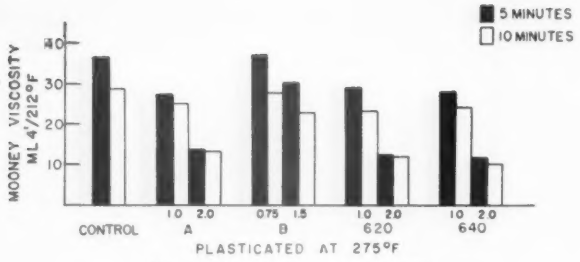

FIG. 4—Plastication of GR-S 1000.

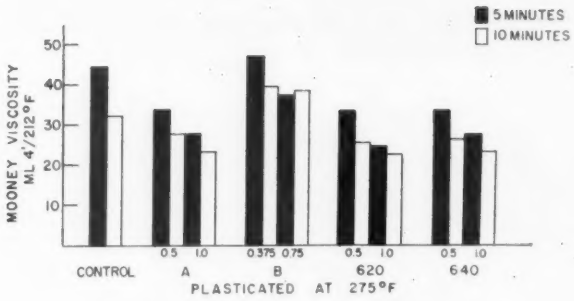

FIG. 5—Plastication of GR-S 1712.

GR-S 1000. The results are shown in Figure 4. Peptizer B is ineffective. At a concentration of 1.5% there is a slight reduction in Mooney over the control. At 1% concentration Peptizers A, 620 and 640 are all quite efficient and equal in activity at milling times of five and ten minutes. At 2% a further significant reduction in Mooney occurs for the three peptizers. The Mooney values of the plasticated rubber samples are about equal, indicating equal potency.

A sample of oil-extended styrene rubber (GR-S 1712) was included to round out the study. The data presented in Figure 5 show Peptizers B, 620 and 640 are effective in breaking down GR-S 1712 at a concentration of 0.5% or higher when used at a temperature of 275°F. Peptizer B is quite ineffective at a concentration of 0.375 or 0.75%. The Mooney values for the rubber plasticated with Peptizer B are slightly higher than the control, indicating Peptizer B promotes gelation.

Summary

The performances of two mercaptan rubber peptizers based on a new raw material source are compared with those of two commercial mercaptan peptizers. The new materials have proved effective peptizers in a laboratory evaluation covering breakdown of natural rubber and three types of styrene rubber.

One of the two new materials was equal in a factory test in performance in natural rubber to the more effective of the two commercial peptizers. Both of the new materials equal the plasticating activity of the more effective commercial peptizer in GR-S 1500, GR-S 1000 and GR-S 1712. None of the peptizers have any effect on the scorch, rate of cure or oxygen bomb aging of natural rubber as compared with an unpeptized control.

Coming Next Month...

Accelerated Ozone Aging—By W. L. Dunkel and R. R. Phelan, Enjay Laboratories, Linden, N. J.

A study of ozone resistance of a number of rubber vulcanizates over a wide range of ozone concentrations under various conditions of temperature and extension; variables which affect the resistance of butyl vulcanizates are investigated.

Pre-Dispersed Accelerators in Rubber Compounds—By John Ware, Ware Chemical Corp., Westport, Conn.

Data which indicate that dispersing sulfur permits the reduction of the amount needed without sacrifice of state of cure, and offers heat aging advantages, plus evidence that pre-dispersing active rubber compounding chemicals changes their characteristics.

High Speed Photography in the Rubber Industry—By G. L. Hall, J. D. Rigby and F. S. Conant, Chemical and Research Laboratories, Firestone Tire & Rubber Co., Akron 17, Ohio.

Use of a high speed camera in the study of materials processing and products testing in the rubber industry; suitable applications as well as limitations are pointed out.

Statistical Quality Control in the Rubber Industry—A Symposium.

A complete report of what five experts in the field of statistical quality control told the Akron Rubber Group at a recent meeting, and the relevance of their knowledge to the rubber industry.

EFFECTS OF

TDI Isomer Ratio in Polyurethane Foams

A formulation factor which has not yet been fully exploited

By G. T. GMITTER and E. E. GRUBER

Central Research Laboratories, General Tire & Rubber Co., Akron, Ohio

POLYURETHANE foams, which have come into prominence in recent years, may range from the flexible to the rigid types, and may be prepared by one of two general methods: (1) the three component or "one shot" method, and (2) the two component or "prepolymer" method.

This paper is concerned with the preparation of flexible foams by the former method using polyesters. To review this method briefly, the three component system makes use of a polyester (almost linear in configuration), toluene diisocyanate or TDI, water, and an activator. The last component usually contains the water, an amine catalyst and emulsifiers. The three basic components are proportionately delivered to a common mixing chamber, where chemical reactions begin, and are then discharged into various containers, where the chemical reaction is continued further, giving rise to the foam.

A very important step in the formation of polyester-isocyanate foams is the chain elongation which results from the reaction of isocyanate groups with the polyester. The formation of foam by reaction of the isocyanate group with water, which liberates carbon dioxide, is another essential step. This reaction also tends to cross-link the various polyester-isocyanate chains. A third reaction occurs among the carboxyl groups of the polyester, giving rise to amide linkages along with more carbon dioxide evolution.

The reactions involved in the formation of polyester-isocyanate foam are complex. The finished foam may contain ester, amide, urea, biuret, allophonate, carbamic anhydride, as well as urethane linkages within the polymer network. All of these are generally lumped together in the polyurethane designation, or as favored by some "urethane."

All of the components in the preparation of urethane foams are essential and play an important role in attaining a good cellular structure with desirable physical properties. Probably the most important component is the toluene diisocyanate, or TDI, which with its great reactivity towards all active hydrogen compounds makes the foam reaction possible. Presently, three commercial variations of TDI are available: a relatively pure grade of 2,4 toluene diisocyanate; a mixture containing 80% of the 2,4 isomer with 20% of the 2,6 isomer, and a mixture containing a 65 to 35 ratio of the 2,4 to 2,6 isomers, respectively.

Since the last two types of TDI are probably most used in the preparation of the flexible urethane foams, the complexity of the foam reaction mentioned previously is further increased by the presence of two TDI isomers. The para isocyanate group in the 2,4 isomer is more reactive than the ortho isocyanate group because of the activation and steric influence of the methyl group. The formation of the first urethane link in the course of reaction brings about another activation influence which has not yet been thoroughly explored.

Experimental Procedure

To obtain a practical evaluation as to the effects of these two isomers in foam, a series of foams were prepared wherein materials and conditions were constant and the only variables present were the 2,4- to 2,6-TDI ratios. To further simplify the systems, no oils were used to control cell structure and the activator compositions were made simple.

In the first series of foam experiments, the following formulation was used: 118 parts by weight Multron R-18 polyester, 25 parts by volume TDI, and 8 parts by volume activator. The activator consisted of the following: 3.0 parts by volume tertiary amine, 2.0 parts by volume non-ionic emulsifier, and 1.2 parts by volume water. This is a high density formulation and on a foam machine would produce about a 4.75 pound per cubic foot foam product.

The experimental foams were prepared in a half-gallon food container (6 inches high with a 5 inch diameter) and mixed with an air stirrer. The activator was first dispersed in the polyester. To this was added the TDI followed by further mixing until complete miscibility was attained. Eight foams were prepared in this way with the TDI isomer ratio varying from 100% 2,6 to 100% 2,4.

Note: This article is a revised, more comprehensive version of the paper presented at the Isocyanate Symposium sponsored by the Society of Plastics Engineers-Upper Midwest Section, at Minneapolis, Minn., October 23, 1956.

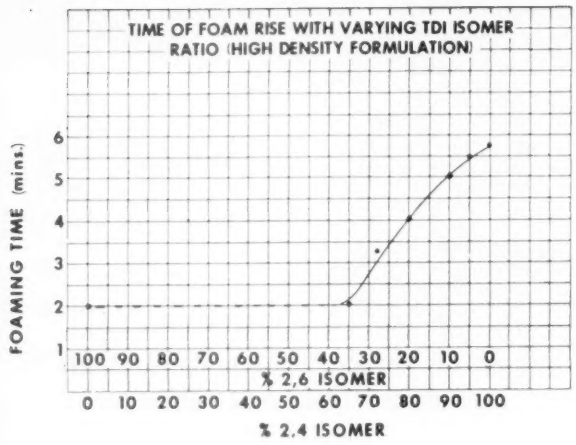
TIME OF FOAM RISE WITH VARYING TDI ISOMER RATIO (HIGH DENSITY FORMULATION)
FOAMING TIME (mins.)
1
2
3
4
5
6
100 90 80 70 60 50 40 30 20 10 0
% 2,6 ISOMER
0 10 20 30 40 50 60 70 80 90 100
% 2,4 ISOMER

Figure 1

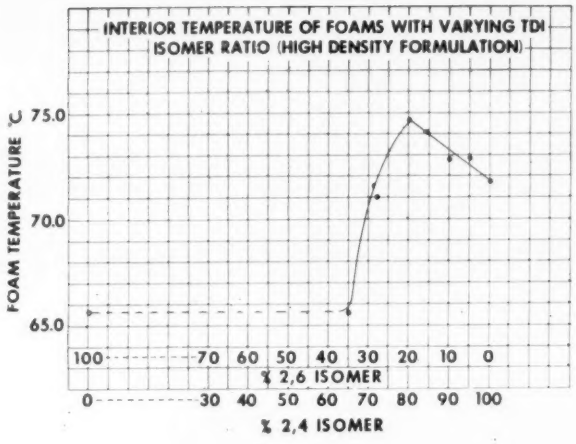
INTERIOR TEMPERATURE OF FOAMS WITH VARYING TDI ISOMER RATIO (HIGH DENSITY FORMULATION)
FOAM TEMPERATURE °C
75.0
70.0
65.0
100 70 60 50 40 30 20 10 0
% 2,6 ISOMER
0 30 40 50 60 70 80 90 100
% 2,4 ISOMER

Figure 2

Experimental Results

Figures 1 and 2 show the effects of varying TDI isomer ratios on foam time and temperature. The foam time represents the elapsed time from the end of mixing to the time required to reach the highest foam peak.

The foam interior temperature was obtained by inserting a thermometer through the wall of the container at a point two inches from the bottom and with the mercury extending to the center, the thermometer being parallel to the bottom of the container. Previous work showed this area to be the hottest point in this type of foam container.

The foam with the 100% 2,4 TDI rose the highest, reaching some eight inches in height. The least foam rise was that in the foam prepared from 100% 2,6 TDI, some 3.5 inches. The foam rise appeared to be directly proportional to the per cent of 2,4 isomer present.

All of the foams prepared with varying amounts of the two isomers were of good initial appearance, though the surface tack increased with higher 2,4 isomer content. The foam made with 100% 2,6 TDI had a number of surface and interior fissures.

On standing overnight at room temperature, the foam containing 80 to 100% of the 2,4 isomer shrunk badly to below the top and away from the sides of the container. In general, the shrinkage in this series of five foams appeared to decrease with increasing 2,6 isomer content.

The foam rise appeared to increase with increasing 2,4 TDI isomer content, indicating that the 2,4 isomer reacted to a greater degree with the water, producing more carbon dioxide and hence, more foam height. The foam rise apparently occurred at the expense of chain elongation between the polyester and TDI and/or cross-linking which resulted in shrinkage due to a structure too weak to maintain the fully expanded cells of the foams made with a high 2,4 TDI content.

The foam temperatures varied only some 9 degrees centigrade, reaching a maximum with the 80/20 2,4-2,6 isomer ratio. The temperature decreased with both lower and higher 2,4 isomer content but seemed to reach a minimum after the 65/35 2,4-2,6 isomer ratio. However, the scarcity of pure 2,6 TDI, even in research quantities, prevented us from investigating the 65 to 100% range of 2,6 TDI.

These results were interesting and it was decided to continue the work further, limiting our ratios from the

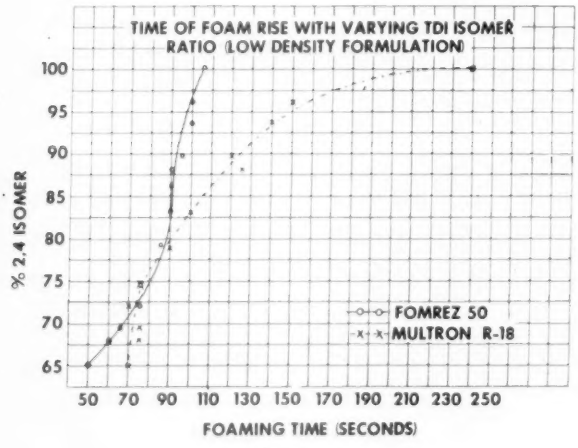

Figure 3

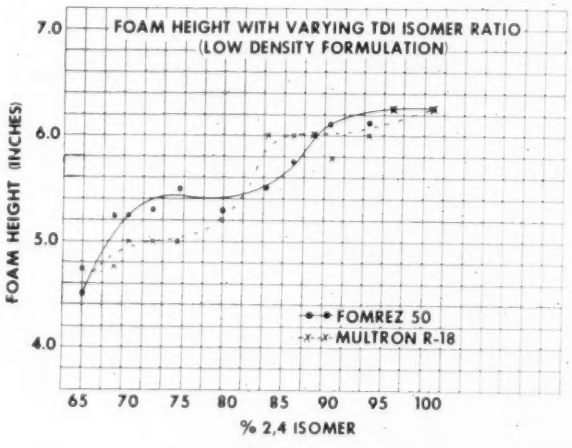

Figure 4

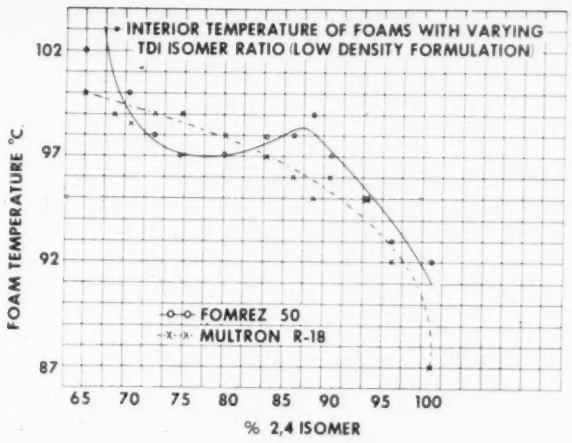

Figure 5

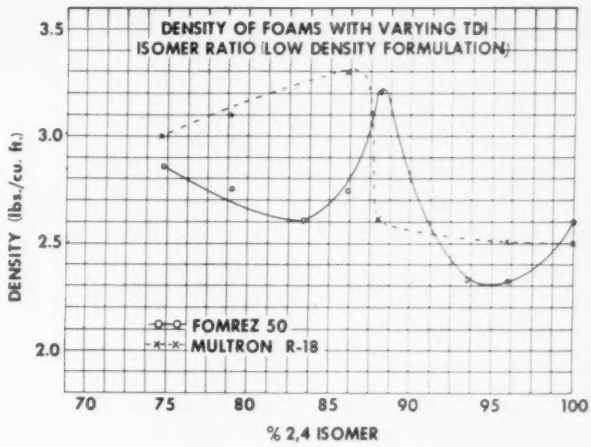

Figure 6

65/35 blend up to the 100% 2,4 TDI range. Likewise, we wanted to investigate the low density formulations, incorporating some anionic emulsifier in another system. Two polyesters were also separately evaluated in the following formulation recommended by the Witco Chemical Co.:

	Parts by weight
Fomrez No. 50 or Multron R-18 polyester	67
Witco 77-86	1
N-Ethyl Morpholine	1
Water	2
TDI	25

Fomrez No. 50 is a polyester with a hydroxyl number of 56.9, and an acid number of 1.6. Viscosity at 28°C. was 13,900 cps. Multron R-18 polyester had a hydroxyl number of 62 and an acid number of 1.0. Viscosity at 28°C. was 12,900 cps. Witco 77-86 emulsifier contains two parts of a non-ionic together with one part anionic surfactants.

As before, the emulsifier, amine, and water were first dispersed in the polyester, followed by the addition of TDI with further mixing. Similar mixing containers were also used. In addition, these foams were postcured for two hours at 100°C. after the maximum foam temperature was determined.

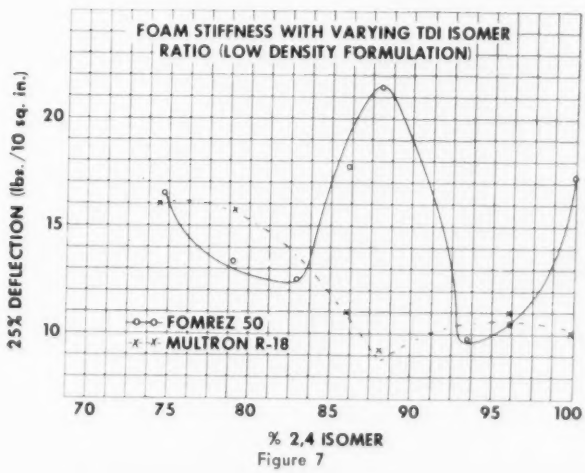

Figure 7

The various TDI isomer ratios were obtained by blending two of the three commercially available TDI grades. The isomer ratio blend obtained by calculation was further verified by infrared spectrographic analysis. Hydrolyzable chloride values for the 65/35, 80/20, and 100-2,4 grades used alone or in blending were almost similar.

Effects of Varying TDI Isomer Ratio

Figures 3 through 7 show the effects of varying TDI isomer ratio on this low density formulation using Fomrez No. 50 and Multron R-18 polyesters. Foam time, temperature, and height are shown along with density and 25 per cent deflection.

The foam height represents the maximum foam rise at the sides of the container. The foam crowns in the center were generally of different shapes.

The foaming time of the Fomrez formulation increased progressively in going from the 65/35 TDI ratio to the 100 2,4 isomer. Changes were generally in slight increments and ranged from 50 seconds for the former to 105 seconds for the latter isomer. Over the same 2,4 to 2,6 isomer range, the foams containing Multron R-18 polyester varied from 70 seconds for the 65/35 blend to 240 seconds for the 100-2,4 in foaming time.

The differences in molar concentrations of polyester would seem to be very slight, yet these differences are real.

For both polyesters, the foam height increases with increasing 2,4 isomer content at very much the same rate. In each type of foam, the 100% 2,4 TDI isomer produced the greatest height. A height close to this maximum is produced with Multron R-18 polyester at about 83/17 TDI isomer ratio. The Fomrez 50 foam appears to approach this maximum at about an 87/13 TDI ratio.

The Fomrez formulations were hotter as determined by exotherm measurements. The foams prepared from the TDI of lower 2,4 isomer contents produced the highest temperatures, 103°C. The lowest exotherm, 92°C., was produced with the 100% 2,4 TDI.

Likewise, the Multron R-18 based foams show the highest exotherm in the 65/35 TDI isomer range with

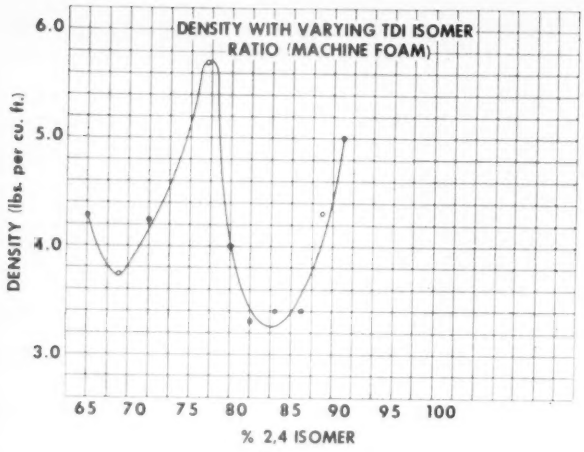

Figure 8

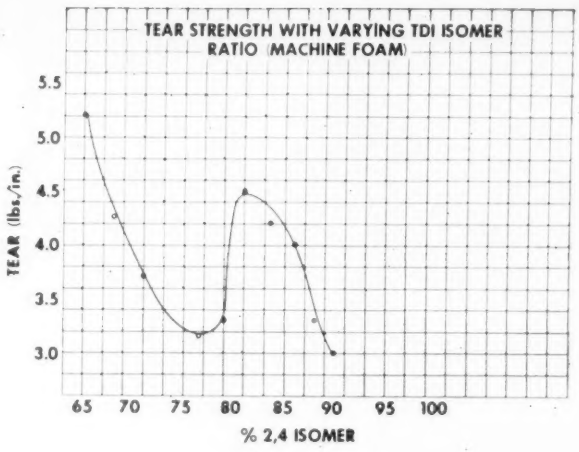

Figure 9

the lowest foam temperature produced with the 100% 2,4 TDI. The exotherms produced by the above two extremes in isomer blends ranged from 100° to 87°C., respectively. It should be remembered that in data presented earlier using a different formulation that Multron R-18 gave a maximum exotherm at an 80/20 TDI isomer ratio. Apparently, peak exotherm may also be shifted by the choice of formulation.

In the isomer ratios covered in this series, only about half of the foams produced were free of fissures enabling us to obtain density and compression deflection data. Density and compression deflection information was obtained on 2-inch thick samples cut out from the original container wherever suitable samples could be obtained.

The lowest densities obtained with the Multron R-18 polyester ranged from 2.6 to 2.5 pounds per cubic foot with TDI ratios starting at 88/12 and going up to 100% 2,4. The lowest 25% compression deflection (or lowest stiffness) data for this polyester also follows the same TDI isomer ratios.

On the other hand, the highest density and highest deflection (stiffness) values are obtained at the 88/12 TDI isomer ratio using the Fomrez 50 polyester. The lowest density (2.73 pounds per cubic foot) and deflection values for this polyester are obtained with TDI isomer ratio of 93.5/6.5 and 96/4.

These differences in density and stiffness occurring at the 88/12 isomer ratio are not readily explainable. We are familiar with the structure of the Multron R-18 polyester, and other than physical properties, we have no information on Fomrez 50 polyester. About the only explanation which suggests itself to account for the differences in stiffness of foams made with these two polyesters is differences in the degree of cross-linking.

Foam surfaces of the Fomrez 50 foams were good for all isomer ratios except for a slight surface shrinkage observed for the 93.5/6.5 and 96/4 TDI ratios.

Foam surfaces of the Multron R-18 foams showed a higher degree of shrinking and wrinkling in the 93.5 to 96% 2,4 isomer content foam as well as in the 83.5 to 88% 2,4 TDI isomer content foams. Some appreciable cell size irregularity was also apparent in the 72 to 79% 2,4 TDI isomer range.

As some unusual trends in the about 85 to 90% 2,4 TDI isomer content foam showed up from the above work, it was felt that further information might be obtained using a foam machine. The machine used is of

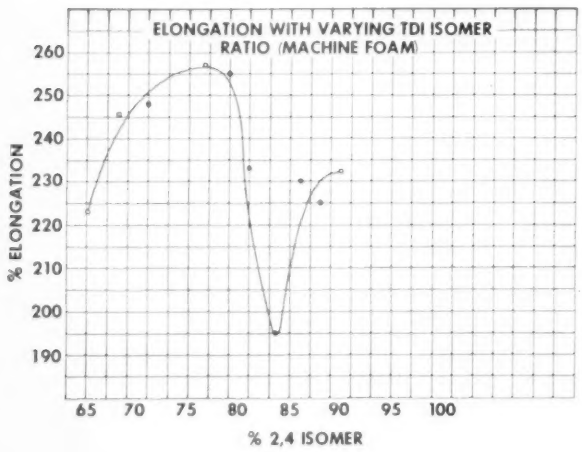

Figure 10

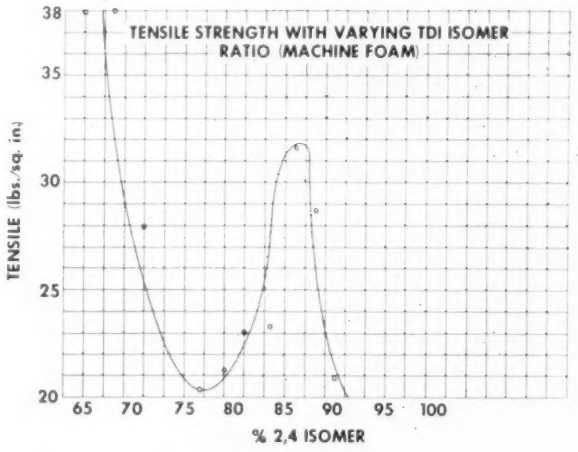

Figure 11

our own manufacture and is the smallest unit in our laboratories. The activator is generally premixed into the polyester and this mixture is kept in one tank. Another tank serves for TDI storage. Zenith proportioning pumps are used to separately deliver the desired amounts of polyester-activator combination and TDI to the mixing head.

The mixing head is divided into three sections which are separated by perforated plates. Three turbine type blades are attached to the mixing shaft in each section. Each of the blades also contains two perforations. The blades are machined so that only a small clearance is provided between the blades and the two perforated discs of its section as well as the sides. This type of mixing head provides a shearing action as well as mixing by forcing the materials through the perforations.

The output of the machine for the series of foam under discussion was about one pound per minute. The foam was collected in aluminum pans, 5 x 9½ x 3 inches in size. After setting up at room temperature, these foams were also postcured at 100°C. for two hours.

The following formulation was used for the machine trials:

	Parts by weight
Multron R-18	90.00
Tertiary Amine	1.50
N-Ethyl Morpholine	1.50
Non-ionic Emulsifier	1.00
TDI	28.75

Figures 8 through 12 depict some of the physical properties obtained with machine foaming of the above formulation using TDI containing from 65 to 100% 2,4 isomer. The 100% 2,4 TDI resulted in excessive shrinkage which prohibited sampling for any physical properties.

The 76/24 TDI area resulted in the foam with the highest density (5.7 pounds per cubic foot). The lowest density foams were obtained using TDI containing from 80 to 85% of the 2,4 isomer.

The compression set values are also highest in the 76/24 isomer area, with the lowest values obtained in the TDI with 2,4 isomer content of 80 to 85%.

Tear values for this machine made foam were highest for the low 2,4 TDI isomer content and lowest at the

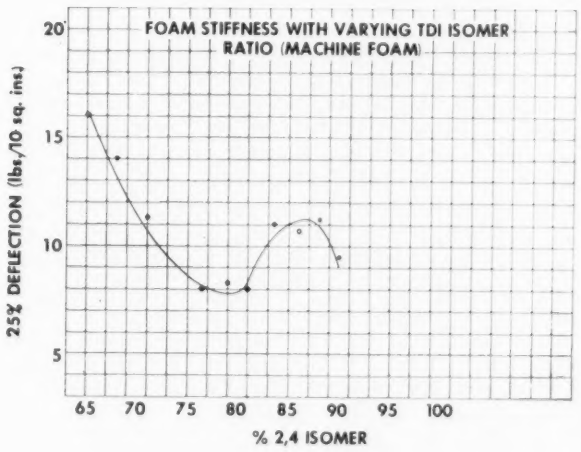

Figure 12

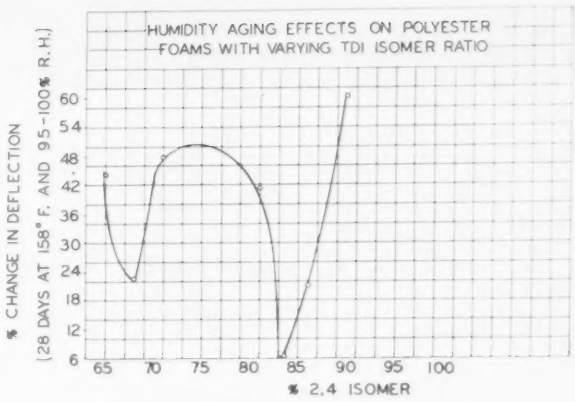

Figure 13

76/24 and 90/10 ratios. The tear data show the 80 to 85% 2,4 foams are somewhat intermediate in value.

The highest per cent elongation results are provided by the foams made up from TDI containing 75 to 80% of the 2,4 isomer. The area around 83% 2,4 isomer provided foams of the lowest elongation.

Tensile strengths are highest for the foams made with the low 2,4 TDI contents and progressively decrease, reaching a low value at the 75 to 80% 2,4 TDI range. High tensile is also found in the 86/14 TDI foams.

The stiffest foams were prepared when the low 2,4 TDI was used. The softest ones were those made from TDI containing 76 to 81% of the 2,4 isomer. Intermediate deflection values were obtained in foams from TDI having an 83 to 88% 2,4 isomer content.

The top surface and cell structure of the foams prepared with the previous formulation were generally good with only a few exceptions. The 65/35 and 68/32 TDI containing foams had smooth surfaces with some fissures present. The 88/12 and 90/10 isomers produced foams without fissures but with considerable wrinkling of the foam surface.

These foams were subjected to atmospheres of 95 to 100% relative humidity at 158°F. in a Hudson Bay Co. cabinet for a period of 28 days. Figure 13 shows the per cent changes in 25% deflection values for these foams after this test period. The foams based on the 83/17 TDI isomer ratio showed the least change in deflection value, which is an indication of its superior resistance to hydrolytic degradation.

Summary

We have shown by the few foam formulations discussed above that there may be a formulation factor which has as yet not been thoroughly exploited, the TDI isomer ratio. It would appear from the data obtained in both hand-mixed and machine-mixed foams, that the 83/17 to the 87/13 TDI isomer range would provide foams with a higher degree of optimum properties, both physical and processing. While this particular isomer ratio area may vary for an entirely different formulation, there probably exists a TDI isomer blend that can provide the maximum or optimum in physical properties as well as in processing for any one particular formulation.

Continuous Curing of Neoprene Extrusions

A method by which neoprene extrusions can be vulcanized continuously on a practical basis in a liquid curing medium

By M. A. SCHOENBECK

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THE economic advantages of continuously curing elastomeric extrusions have been recognized by men in the rubber industry for a great many years. Considerable effort has been expended in the development of systems for continuous curing, but relatively few methods have reached commercial reality. Probably the best known and most widely used method of continuous curing is that employed by the wire and cable industry, in which the coated wire is passed directly from the extruder through a long vulcanizer containing high pressure steam. Other processes involving hot air tunnels, radiant heaters or dielectric units have been used commercially to a limited extent.

A novel method with great promise is under development at the DuPont Elastomers Laboratory. With this process, neoprene extrusions can be vulcanized continuously on a practical basis in a liquid curing medium at temperatures of 400 to 600°F. We call this the LCM method. The heat transfer with the liquid media is very rapid—approximately six times as fast as in air—allowing curing times of less than 30 seconds. Translated to production figures, this means an extrusion rate of 40 feet per minute can be attained with a curing tank 20 feet in length.

The idea of curing continuously in hot liquids is not new. Patents disclosing processes of this type date back as far as 1915. For various reasons these processes have seen little commercial use. Probably the biggest roadblock has been the problem of porosity in solid extrusions. The solution of this problem by proper compounding and extrusion techniques has opened the door for broad utilization of the LCM method.

Equipment Requirements

The equipment required for utilizing the LCM method is shown in Figure 1. The extruder is a very important part of this process, and its design and operation will be discussed below in greater detail. Following the extruder some type of pre-coating device may be needed depending on the type of heat transfer medium used. The basic part of this equipment is the curing tank. This tank should be of sufficient width and depth to accommodate the largest size extrusion that is anticipated. The length will depend on the operating temperature that is to be used, the cure rate of the compound and the extrusion rate that is desired.

The tank should be insulated with at least two inches of rock wool or similar material. It can be heated electrically by either immersion-type heaters or by strip heaters applied to the outside of the tank. Some means is required to keep the extrusion submerged and to convey it through the bath. This can be done with either a series of driven rollers or by a thin stainless steel belt.

Following the curing tank, a cleaning or cooling tank is required. The extrusion then moves directly to a wind-up reel or can be cut to length for shipping. Over the equipment a hood and exhaust system are required to remove the fumes evolved from the tank and from the hot cured extrusion. The fumes from the hot extrusion tend to be irritating to the eyes and may be toxic with certain types of compounding materials.

Heat Transfer Media

Either molten metals or certain oils can be used as the heat transfer medium in the LCM process. There are advantages for both types of media, but generally molten metals are preferred. Molten metals can be used at higher temperatures, thus allowing faster cures. In addition, the use of a pre-coating of talc or oil prevents the molten metal from clinging to the extrusion surface. Therefore, there is no bath loss and little need for cleaning the extrusion.

Probably the biggest disadvantage of the molten metal is associated with its high density. The pressure due to the weight of the metals tends to distort certain types of extrusions, particularly hollow cross-sections with thin walls. To avoid this type of distortion it is necessary to use a low density type of heat transfer medium such as a high flash point oil. Since materials of this type cannot be safely heated in an open tank to temperatures as high as molten metal, a longer cure tank is required or a slower extrusion rate must be used. In addition, some means must be provided to remove the oil that clings to the surface. This can be done with a solvent bath or by washing the product in hot water containing a detergent.

There are a large number of low-melting alloys that can be used. The alloy that is selected should have a

Note: This paper was presented before a meeting of the Chicago Rubber Group, Chicago, Illinois, March 14, 1958.

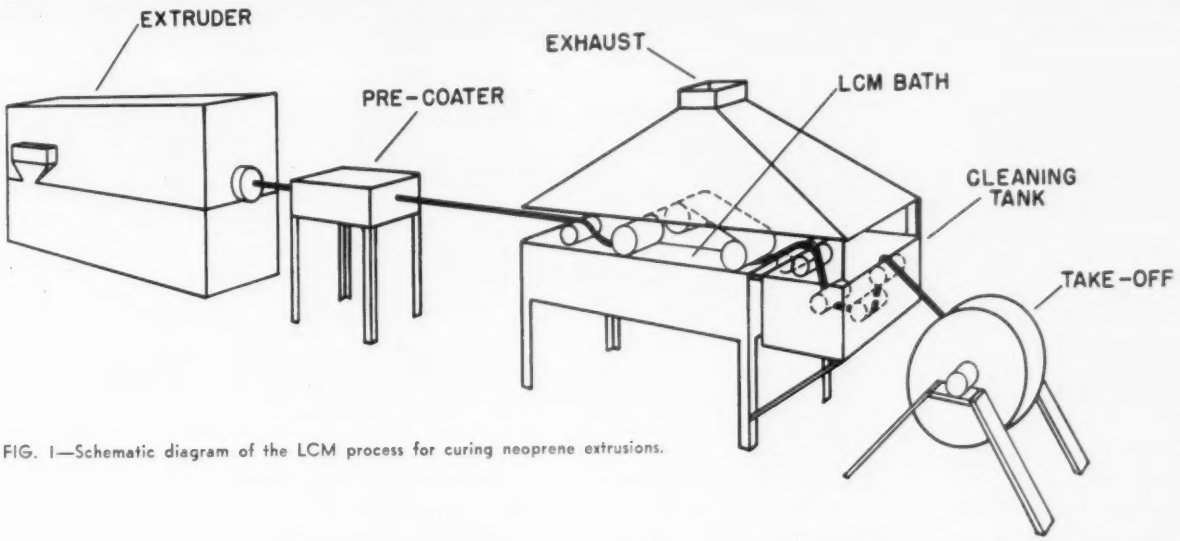

FIG. 1—Schematic diagram of the LCM process for curing neoprene extrusions.

melting point at least 100°F. below the operating temperature. It should be stable at temperatures above 600°F., since curing elastomers at this temperature is feasible. The material should be relatively stable to oxidation to minimize oxide formation and bath material loss. It should be relatively non-toxic and not contribute to discoloration of light-colored extrusions. [Asarcolo 281 (available commercially from Federated Metals Division, American Smelting and Refining Co.), an eutectic mixture of 42% tin and 58% bismuth melting at 281°F., has been used successfully.]

Heat transfer oils that can be used in the LCM method must be relatively non-toxic, have good heat stability, and low volatility with a flash point above the proposed operating temperature. In addition, the oil should not attack or soften the extrusion. A low-cost paraffinic type petroleum oil can be used with neoprene extrusions. Silicone fluids are generally satisfactory but are relatively expensive. They would probably have to be reclaimed from the cleaning bath to be economically practical.

Curing Considerations

For a high production rate in a curing bath of practical length, a very fast cure rate is desirable. The thioureas (diethyl thiourea, diortho tolyl thiourea and NA-22), and the aldehyde amines (Accelerators 808 and 833) are effective in producing fast cures in neoprene. Further speed can be obtained by choosing the proper metal oxide combination. Five parts of litharge and five parts of zinc oxide are recommended for black or dark-colored compounds. For light-colored compounds a combination of two parts of magnesia and five parts of zinc oxide is recommended to avoid discoloration.

Obviously, compounds of this type will tend to be scorchy. However, practical methods have been developed for handling them safely. In the laboratory, where small batches are used and the heat history can be controlled, the accelerators are added on the warm-up mill just prior to extrusion. For factory operations it will probably be necessary to add the accelerator to the surface of the base stock and take advantage of the mixing action in the extruder to disperse the accelerator.

This can be done in at least two different ways: (1) By pelletizing the base stock and dusting a measured amount of accelerator on the surface of the pellets, or (2) By feeding a uniform strip of the base stock from the warm-up mill under a pot of molten accelerator. The accelerator is allowed to drip at a controlled rate onto the strip. It freezes as small droplets and adheres to the feed strip. Diethyl thiourea (DETU) is particularly effective with both methods because it melts at 170°F. and is easily dispersed in the extruder.

Neoprene compounds accelerated in this manner can be cured in about 20 seconds at 425°F. In a five-foot laboratory curing tank this allows an extrusion rate of fifteen feet per minute.

The physical properties of neoprene compounds cured in this manner are very similar to those obtained from a

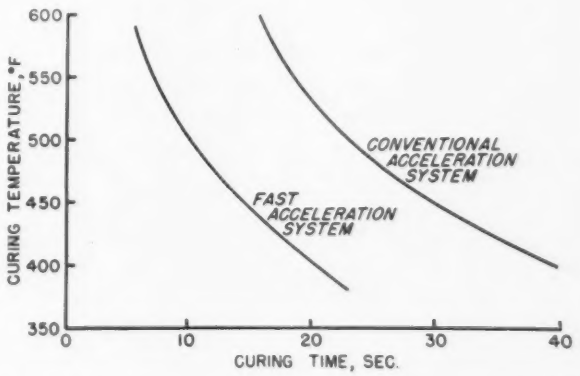

FIG. 2—Cure rate of tubing (¼ inch I. D., ½ O. D.) in molten metal.

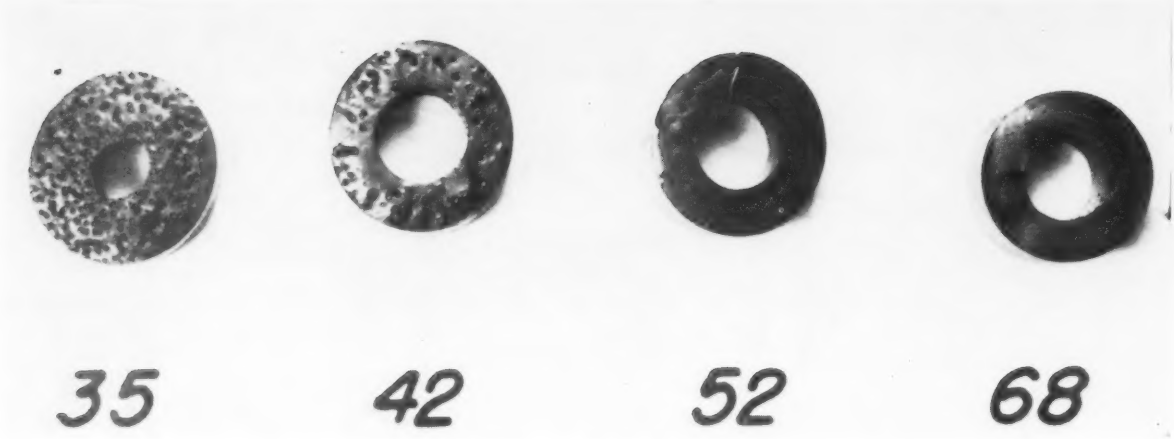

FIG. 3—Porosity versus viscosity of extruded specimens (ML 2½ at 212°F.).

conventional press cure. A typical comparison is shown below:

	Press cure 4 min./307°F.	LCM cure 30 sec./475°F.
Modulus at 100%, psi	800	500
Tensile Strength, psi	2200	1900
Elongation at Break, %	230	230
Hardness, Shore A	65	61

It is also possible to extrude and cure neoprene compounds using conventional acceleration systems. Laboratory work has shown that such compounds require about twice the time at any given temperature to produce the same state of cure. This can be seen in Figure 2 where the time versus temperature relationships are plotted for both types of curing systems. When using conventionally accelerated compounds, it is possible to obtain a cure in the same length of time by raising the curing temperature approximately 100°F. This allows the use of standard compounds without the need for an excessively long curing tank.

The elimination of porosity in solid extrusions is dependent upon a number of factors. These include compound viscosity, cure rate, and extruder design. Porosity is caused by expansion of gases or volatile materials as the extrusion is heated during the curing process. Obviously, materials, such as plasticizers, that are volatile should be avoided in compounds that are to be cured in the LCM process.

It is also necessary to eliminate the entrapped air that is normally found in rubber compounds. With many stocks above 70 durometer, this is no problem, because the viscosity of the uncured stock is high enough to work the air out in the extruder. As the compound viscosity decreases, the porosity increases, as can be seen in Figure 3. The extruded cross-sections shown here were made from four similar compounds varying only in the amount of carbon black which they contained. The effect of viscosity on porosity is quite apparent. The viscosity of compounds below 70 durometer can be increased by following two basic principles:

(1) Use Neoprene Type WHV. In lightly loaded compounds, where Type WHV would produce too much nerve, a blend of Type WHV with another type of neoprene would be preferred.

(2) Use reinforcing types of fillers such as SRF or FEF carbon black. MT carbon black and mineral fillers should be kept at a minimum as they tend to produce soft, mushy stocks.

A faster cure rate will frequently aid in the elimination of porosity. This can be noticed in extrusions where a

TABLE I—TYPICAL COMPOUND FOR LCM CURE

	Parts
Neoprene Type WHV	100.0
Neozone A	2.0
Stearic Acid	0.5
SRF Carbon Black	130.0
Butyl Oleate	10.0
Sundex 53	30.0
Litharge	5.0
Zinc Oxide	5.0
Diethyl Thiourea	1.0
CURE: 30 seconds at 475°F.	
Tensile Strength, psi	1900
Elongation, %	230
Hardness, Shore A	61

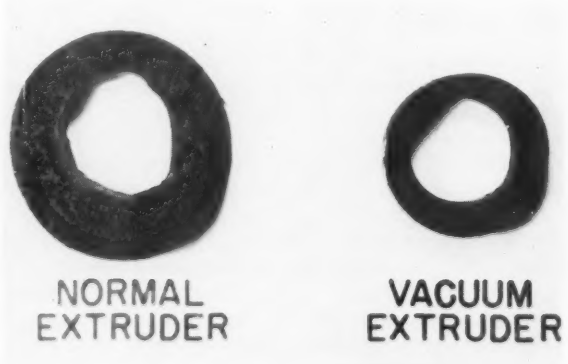

FIG. 4—Elimination of porosity with a vacuum extruder (very soft compound).

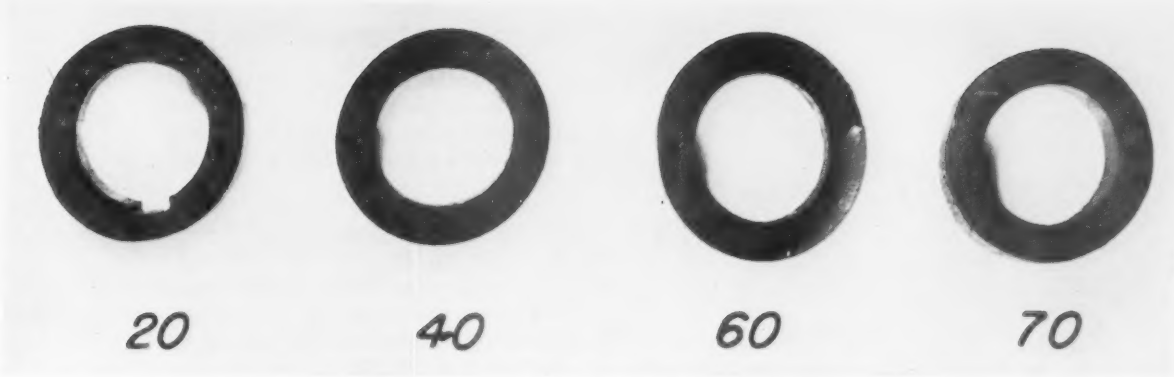

FIG. 5—Porosity versus extruder speed of extruded sections (figures denote rpm).

small amount of air still remains. Increasing the rate of cure causes the extrusion to set-up before the air can expand. Thus, the air remains undetectable in the finished product. A typical compound that has produced good results is shown in Table I.

Extruder operating conditions and design also influence porosity. For instance, lower extrusion temperatures have the same effect as increasing the compound viscosity. However, there is obviously a minimum temperature limit below which rough extrusions would result. Higher extrusion speeds will also reduce porosity.

Extruders having a barrel length to diameter ratio of 10 to 1 or greater are effective in reducing porosity because of the greater working action that takes place. Extruder screws with higher compression ratios have the same effect.

These compounding and extrusion techniques go a long way toward solving the problem of porosity and enable the rubber processor to successfully extrude and cure a wide variety of compounds by the LCM method. However, to obtain the maximum use of this process, a vacuum-type extruder is essential. This type of extruder extends the practicality of this process to include: (1) Conventional compounds as low as 40 durometer, (2) Non-black compounds, and (3) Very highly extended compounds.

The effectiveness of a vacuum extruder in eliminating porosity can be seen by comparing the two extrusion specimens in Figure 4. Both specimens were made from the same soft compound and cured in the same manner. This is an extreme case where normal extrusion techniques result in very bad sponging, while the vacuum extruder produces a dense product. With stiffer compounds the difference will not be as striking, but in many cases the use of a vacuum extruder will make the difference between a solid and a porous extrusion.

With very soft compounds (40 durometer) higher extrusion speeds are required to eliminate all the porosity. This is shown in Figure 5. As the speed is increased from 20 to 70 rpm, the porosity decreases until it is not detectable.

Vacuum extruders can be designed to pull the vacuum through the barrel wall or through the screw. At the present stage of development, the vacuum screw appears to be the most effective for eliminating porosity. (Vacuum extruders of this type are covered by U. S. Patent No. 2,774,105 assigned to E. I. du Pont de Nemours & Co.) The design of the screw and the location of the vacuum ports is very important for efficient performance. A screw which has given excellent results is shown in Figure 6. The annular rings or dams on the screw produce the type of flow in the extruder required for effective elimination of air from the stock by the vacuum.

Continuously Cured Sponge

The LCM process is also adaptable to the continuous extrusion and curing of unicellular neoprene sponge. It provides a rapid and economical method of preparing sponge products having a wide variety of shapes, sizes, and physical properties.

When compounding neoprene for extruded sponge applications, it is important to obtain the proper uncured viscosity. Naturally, if the viscosity is too high the sponge will not expand sufficiently, and if it is too low, the extrusion will tend to distort during the curing operation. The viscosity can be controlled very easily by using the correct blend of Neoprene Type WHV with Type W or WRT. A compound which has given good results on laboratory equipment is shown in Table II.

TABLE II—TYPICAL SPONGE COMPOUND CURED BY LCM METHOD

	Parts
Neoprene Type W	50
Neoprene Type WHV	50
Aktone	4
Neozone A	2
Magnesium Oxide	4
SRF Carbon Black	30
MT Carbon Black	20
Light Process Oil	15
Aquarex NS	2
Unicel ND	12
Zinc Oxide	5
Diethyl Thiourea	4
STOCK	
Specific Gravity	1.30
Cost $/Lb. - Vol.	0.29
SPONGE	
Density	18-20 Lb./Cu. Ft.
Cost $/Lb. - Vol.	0.09
Compression/Deflection	4.5 to 5.0 psi
% Closed Cells	50%

FIG. 6—Vacuum screw which has produced excellent results in eliminating porosity from neoprene extrusions.

DETU is used as an accelerator to provide the rate of cure necessary to produce a closed cell structure. A slower rate of cure, such as that produced by NA-22, will result in predominately open cells. A combination of both accelerators can be used to produce extrusions of varying percentages of open and closed cells.

The load-carrying capacity of such sponge can be increased by using more SRF carbon black and less MT carbon black without changing the density. By replacement of the carbon black with whiting and titanium dioxide the above compound can be converted to a non-black sponge.

This type of compound can be mixed in either a Banbury or on a mill. The DETU, however, should be withheld until just prior to extrusion. Since stocks of this type are very soft and build up little heat during mixing, the DETU can safely be added at the warm-up mill.

Compounds of this type extrude very smoothly. Extruder temperatures somewhat higher than normal are recommended for best results — 200°F. on the die and head, 160 and 180°F. on the barrel. The speed of extrusion is dependent on the rate of cure and the rate of blow. In a five-foot laboratory tank, satisfactory cure and expansion of thin extrusions can be obtained at a rate of 10 to 12 feet per minute.

Advantages of the LCM Method

Besides the obvious cost savings from reduced handling and thus lower labor requirements, there are a number of other advantages to be gained with the LCM process. Further savings can be realized because of the lower capital investment required for the LCM type of curing equipment as compared to conventional steam vulcanizers. In addition, less floor space is generally required.

Less scrap should also result, particularly in products where the extrusions are cut to length and pan cured. Normally, the ends shrink back and must be cut off and discarded as oversize. Other plus factors are: (1) the rapid rate of cure results in excellent extrusion detail, and (2) the smooth, glossy surfaces obtained at the extruder can be retained after the cure.

Applications

The LCM process is particularly attractive for extrusions that are produced in large quantities, but is adaptable to almost any type. Numerous automotive extrusions, both solid and sponge, lend themselves very well to this process.

In the building industry, sealing strips for curtain wall constructions represent another sizable market. In this field the lower processing costs improve the competitive position of elastomers versus thermoplastic polymers. Miscellaneous extrusions such as pipe gaskets, milk tubing and washing machine drain hose can also be cured by this process.

The wire and cable industry may find the LCM process economically attractive. This is particularly true of those companies contemplating additional processing equipment. The lower capital investment and the reduced floor space required could be deciding factors.

There are undoubtedly many other applications in which the LCM process can be used to advantage. It is expected that this method will be widely utilized by many extruded goods manufacturers to improve their competitive position in the complex elastomers and plastics fields.

Automatic Program Control of Batching Operations

A NEW formula board resembling a simple cribbage board has been introduced by Richardson Scale Co., Clifton, N. J. as a means of achieving complete automation in the program control of batching operations. When the formula board is used for pre-setting weight data in an automatic proportioning panel, it is said to eliminate the need for manual weight settings and the possibility of human error in electronically controlled operations involving the proportioning of bulk materials. Simple and compact in design, the combination board and panel are used as components in Richardson's Select-O-Weigh systems, which provide automatic control of storing, feeding, conveying, weighing, mixing and discharging of bulk ingredients. Typical applications of the system include the formulation of rubber compounds as well as numerous others.

The formula board is especially helpful for processors using many mixing formulas with frequent changeover, as the interruptions involved in changing from one formula to another are eliminated simply by removing one board and replacing it with another of pre-determined settings. This procedure is said to result in a substantial speed-up of operations, and also to make for greater accuracy since control is no longer subject to error at the hands of an operator.

The operator need only insert the formula board into position and press a starter button. The rest is completely automatic, and the proportioning and mixing operations are continued without operation. According to the manufacturer, there is no limit to the amount of ingredients or number of functions that can be controlled by the board.

PROPERTIES AND USES OF

Fusible Silicone Rubber Compounds

An outline of the unique properties of a new class of silicone rubber compounds developed to provide building tack

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OVER the past few years, many advances have been made in the technology of silicone rubber. In addition to the up-grading of physical properties, improvements have been made in processability by "preconditioning" the compounds. For some time, the application of rubber on items requiring wrapped construction has been difficult because the silicone rubber tapes used have not had a building tack. Attempts have been made to impart tack to silicone rubber by semi-curing a product or by adhesive-coating cured silicone rubber. Both of these methods meet the requirements by sacrificing properties in service to satisfy fabrication needs. Now, fusible silicone rubber compounds have been developed to provide building tack while maintaining the good physical and electrical properties inherent in the premium grade silicone compounds.

General Properties

Silicone rubber compounds have always been known for their excellent release and non-sticking properties. Now, a new family of silicone rubber compounds has been developed with built-in adhesive properties. These materials are called "fusible" compounds. Fusible compounds are defined as silicone rubber compounds, which, after any cure—even a full postcure—exhibit pressure sensitive surfaces. Although they show no stickiness to the touch, cured parts made from a fusible compound will adhere on contact; they will also adhere to other silicone rubbers if applied under tension. Actual fusion of the rubber will occur slowly at room temperature. The application of heat or pressure will greatly accelerate the fusion into a solid mass. After fabrication, the parts may be dusted with mica or silica to provide a non-sticking surface. With the use of silicone primers, the fusible compounds give excellent bonds to metals and fabrics.

Even though these unique properties are attained by a basic modification in materials, the fusible compounds can still be cured with peroxide type catalysts, including Union Carbide X-1960 di-*teritary*-butyl peroxide curing compound.

One of the important properties of these new compounds is the complete fusibility after any cure; thus, a mold cure, continuous vulcanization, hot air cure or oven cure can be used. This feature allows the fabricator to use any convenient method of fabrication—molding, extruding, calendering or solution coating. In general, the exact degree of building tack is controlled by the initial cure. While these materials are not a room temperature curing variety, the building tack does seem to improve on aging after the initial cure.

One of the major uses of the fusible compounds will undoubtedly be in the form of tapes, either supported or unuspported. Tapes made from the fusible compounds would offer the following features:

(1) Excellent building tack—cable wrapping or duct lay-ups will not pull open.

(2) Easy fusibility to homogenous mass—generally accomplished by slight heating.

(3) Excellent physical and electrical properties.

(4) Easy fabrication—no dual catalyst or adhesive coating to apply.

(5) Complete cure prior to application—should give maximum resistance to reversion and optimum properties.

(6) Excellent bonds to metals or fabrics.

(7) Good shelf life.

The advantages offered by the fusible compounds will eliminate many of the problems found with semi-cured or adhesive-coated tapes.

In addition to the usual insulating variety, fusible silicone rubber compounds can also be made in a conductive type. Blends can be made to obtain a range of resistivities. In further describing the fusible compounds, the properties of two specific materials will be discussed: a general purpose insulating type, and a conductive compound.

The first member of this new family to be studied was a nominal 50-durometer compound, now identified as Union Carbide K-1605R. This compound has a built-in

Note: This paper was presented before the Division of Rubber Chemistry, American Chemical Society, at New York, N. Y., September 13, 1957.

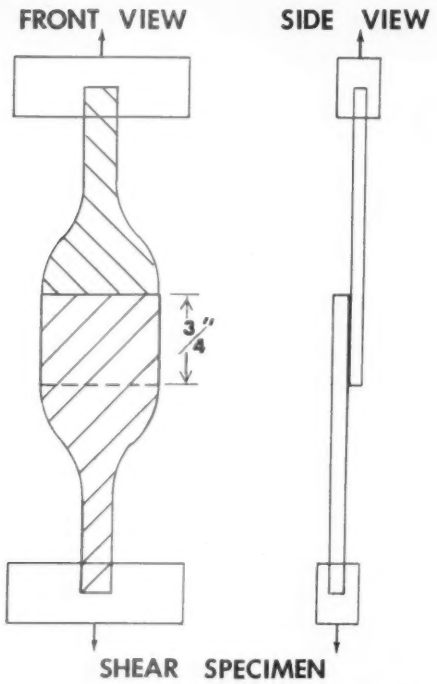


FIG. 1—Schematic diagram of arrangement of broken dumbbell specimens used in testing adhesive properties.

"controlled reactivity" accompanied by a "pre-conditioned" character which allows it to be freshened in a few seconds. The excellent green strength exhibited by K-1605R is typical of all of the new fusible compounds.

The following properties of K-1605 were obtained on an ASTM slab, cured with 1.2 parts of dichlorobenzoyl peroxide paste:

Mold cure, 10 minutes at 250°F.	
Hardness, Shore A	27
Tensile Strength, psi	900–1000
Elongation, %	725
Tear Strength, Die B, pi	70
Postcured, 24 hours at 480°F.	
Hardness, Shore A	45
Tensile Strength, psi	800–900
Elongation, %	400
Tear Strength, Die B, pi	94
Specific Gravity	1.15

The mold cured properties are typical of premium grades silicone rubber. The post-cured properties show that K-1605R has good physical properties in addition to its unique features.

The following data, obtained after a heat-aging cycle of 70 hours at 450°F., indicate the excellent dry heat resistance of the compound:

Hardness Change, units	+3
Tensile Change, %	—6
Elongation Change, %	—9
180° Bend	No crack

Even after this 70 hour cycle, the material still exhibits a pressure-sensitive, fusible surface.

TABLE I—VISCOSITY-BUILD RELATIONSHIP OF A K-1605R SILICONE RUBBER SOLUTION

Viscosity (cps)	Total Tape Thickness After 1 Dip at 4 in./Min.	Total Tape Thickness After 2 Dips at 4in./Min.
1400	6.0 Mils	12 Mils
1900	7.0 Mils	14 Mils
2400	7.5 Mils	15 Mils

Tape = starch-oil sized ECC-116 glass fabric (4 mil).

The resistance to ASTM oils is shown by the following:

ASTM Oil No. 1, 70 hours at 300°F.	
Hardness Change, units	—9
Tensile Change, %	—30
Elongaiton Change, %	+8
Volume Change, %	+5
ASTM Oil No. 3, 70 hours at 300°F.	
Volume Change, %	+50

The volume changes are typical for general-purpose silicone rubbers.

The additional data below show that the compression set is somewhat higher than the best silicone rubber compounds, but this only emphasizes the fact that a single silicone rubber compound for all applications cannot yet be manufactured.

Compression Set, Method B, 70 hours at 300°F.	
Original Deflection, %	50
Water Immersion, 70 hours at 212°F.	
Volume Change, %	+4
Reversion, 6 hours at 480°F.	
Bomb Under Stress	
Hardness Change, units	—4

The resistance to reversion after a full postcure is of interest. The term reversion is used to denote the depolymerization of siloxane gums when a cured elastomer is heated in a confined space under stress. The amount or degree of reversion is evaluated as the loss of hardness; in extreme cases, the elastomers are degraded to a soft, semi-fluid grease. In our laboratory, the degree of reversion exhibited by the various compounds is determined by enclosing a compression set disc or plied-up specimen in a specially designed stainless steel vessel similar to a Paar analytical bomb. The top is tightened so as to place stress on the sample, and the unit is heated for six hours at 250°C.

The following figures, derived from tests run according to standard ASTM methods on a 30 mil slab, reveal that K-1605R has excellent electrical characteristics:

Dielectric Constant, 100 cps	2.95
Dielectric Strength, v/mil (30 mil slab)	745
Power Factor, 100 cps	0.0013
Resistivity, ohm-cm, 75°F.	$3.9\ (10)^{16}$

In initial evaluations a quick, easy test was needed to indicate adhesive properties. A schematic drawing of the system used is shown in Figure 1. The ends of a broken dumbbell were merely pressed together; the specimen was then pulled in a Scott tensile machine.

TABLE II—COMPARISON OF PROPERTIES OF A FUSIBLE AND NON-FUSIBLE CONDUCTIVE SILICONE RUBBER

POSTCURE: 24 HR./480°F.							
				Tear	Adhesion Shear	Resistivity ohm-cm	
Rubber	Hardness	Tensile	Elongation	Die C	(lb.)	Mold	Postcured
Y-1622	73	740	200	111	13.0	16	1–2
K-1516	60	650–750	200–230	35–40	0.0	100	3–5

An average of eight pounds force was needed to pull apart the samples from a mold cured slab, while sixteen pounds force was needed to separate or break the samples from the postcured slabs. A conventional silicone rubber compound gives a zero pound force reading, for it will not stick to itself. The larger force needed to separate the postcured samples shows that the adhesive properties are improved with a postcure or any additional cure.

The fusible compounds, such as the one discussed here, can be readily bonded to most metals. In order to insure the maximum adhesion, the use of a metal primer, such as Chemlok 607 (manufactured and distributed by Lord Manufacturing Co., Erie, Penna.) is recommended. The use of a primer on fabrics prior to bonding them is also suggested.

Dispersion of the Compounds

As was mentioned earlier, the fusible compounds can easily be dispersed in solvents such as xylene. Typical properties of a nominal weight per cent solution of K-1605R in xylene are as follows:

Appearance and Color	Thick, red fluid
Solids Content (by weight)	25 ± 1%
Viscosity (cps. average)	15,000
Specific Gravity	0.94
Weight Gallon (lb.)	7.31

The viscosity was measured with a Brookfield viscometer, Model LVF, No. 4 spindle, 12 rpm. Normally a catalyst loading of 3.4 parts of crystalline benzoyl peroxide per 100 parts of solid is used for hot air or tower curing.

Solutions of K-1605R have a rapid change in viscosity over a range in solids content from 20 to 29 weight per cent. This relationship, shown in the data below, usually denotes a thixotropic solution.

Solids, %	Viscosity (cps)
29	28,000
26	18,000
23	2,500
20	1,000
17	500

However, excellent coated fabrics can be made from such solutions if one allows for this property. The viscosity was measured as before, with a Brookfield viscometer, Model LVF, No. 4 spindle, 12 rpm.

The total build obtained on a 4-mil glass fabric at three different viscosities is shown in Table I. In general, the build on a tape prepared by a free-dip process is dependent not only on the viscosity of the solution but also on the dipping rate. In these tests, a constant dipping rate of four inches per minute was used with a full tower cure after each coat. It can be seen that the second dip provides three times the build found on the first dip.

In fabrication of the fusible compounds, the curing cycle is important in setting the desired sticking properties. As with any solution coating, desolvation must be done prior to the actual cure. Conventional tower times and temperatures can be used; thus the tape would pass through a 70° to 125°F. zone prior to reaching the desired 300°F. curing temperature. It is possible to postcure the tape for 24 hours at 480°F. to develop optimum reversion resistance without loss of surface tack.

The properties of K-1605R coated glass cloth are dependent on the base fabric used. Results obtained on 4-mil, starch-oil sized ECC-116 glass fabric follow:

Property or Test	Results
Over-all Tape Thickness (mils)	10 ± 1
Crease Resistance (lb./1 in. width)	120–130
Dielectric Strength (v/mil)	1100

These tests, run in accordance with MIL-C-2194B, show crease values of 120 to 130 pounds-per-inch width and a dielectric strength of 1100 volts per mil. With specially treated glass cloth, crease values of 150 pounds-per-inch width have been obtained on 10-mil tapes in the laboratory with no degrading effects on electrical properties. Bias glass cloth has also been successfully coated with K-1605R.

A Conductive, Fusible Silicone Rubber

In addition to the insulating, fusible compounds, conductive types were considered. The first member of the conductive, fusible compounds to be developed was identified as Y-1622. This compound, which contains carbon black filler, can be cured only with Union Carbide X-1960 di-*tertiary*-butyl peroxide curing compound or with dicumyl peroxide. It can be extruded, molded, calendered, or dispersed in solvents for dip coating.

Table II gives the typical properties of Union Carbide Y-1622. For comparison, the data on a non-fusible conductive silicone rubber compound, K-1516, are listed. The improved properties of Y-1622 are quite apparent in the tear strength and resistivity values.

Prior to the development of Y-1622, blends of K-1516 and K-1605R were studied for the intermediate resistivities. The results are shown in Table III. Of course, the optimum fusible properties would be obtained by using Y-1622 in place of K-1516. However, blends containing 30 weight per cent or more K-1605R have adequate fusible characteristics. Basically it is possible to blend reproducibily for any desired resistivity value.

While the fusible series of silicone rubber compounds has not yet been subjected to an extensive field evaluation, certain unique properties have been investigated sufficiently to suggest potential applications.

FIG. 2—Tack of K-1650R tapes. The tape at the left, with a Mylar interleave, can be unrolled easily; the tape on right, with no interleave, bonded at room temperature under light tension.

Unsupported Tapes

One of the first forms of material to be made from K-1605R was unsupported tape. This tape can be prepared by extruding or calendering and slitting. The degree of cure used is variable at the fabricator's convenience.

Figure 2 shows the degree of pressure-sensitive adhesive tack that K-1605R unsupported tapes exhibit. The roll on the left has a Mylar interleave and can be unrolled easily. In contrast, the outer section of the tape on the right was rolled up without an interleave. It should be noted that the tape was bonded together at room temperature under very light tension; it cannot now be removed as a single layer. This is a feature of unsupported tape only; supported tapes will not bond at room temperature to this degree.

For use as a cable splice or terminal wrapping, one would wrap the tape on itself under slight tension. The tape will adhere tightly to itself and, over a period of days, form a stronger bond. The ultimate bond between the layers—a complete fusion—would be attained by heating at a temperature of 350°F., or above, for a period of 30 minutes or by internal heating in operation. After fusion has occurred, the layers of tape cannot again be separated. This tape has proven very useful in splicing connections on ovens and heaters.

Since these tapes adhere to themselves readily with no external heat, protective wrappings can be applied in the field as well as in a plant. Thus not only terminals but even electronic equipment and glass tubes can receive a protective wrapping.

The unsupported fusible tapes can also be used to wrap various electrical components. For some applications, a higher-durometer fusible compound may be needed; these are currently being field evaluated.

These tapes also function very well as bonding aids; they are especially useful in places where a liquid or fluid tie cement cannot be used. If bonds to metal are desired, the use of a metal primer such as Chemlok 607 is suggested.

In the manufacture of cable for shipboard use, large quantities of silicone rubber coated glass cloth are used between the insulating layer and sheath. Whereas regular silicone rubber coated glass tapes slip easily, supported fusible tapes can give the right amount of building tack needed. Tapes can be made from K-1605R to meet the requirements of MIL-C-2194B, Shipboard Cable-Type T, and MIL-W-19381A, Special Purpose Nuclear Cable.

In the wrapping of coils for motors and generators, adhesion and rubber stability have been major problems. In order to get adhesion to the copper, many adhesives including the available silicone primers and many organic paints or shellacs have been used. Initial laboratory tests, utilizing Chemlok 607 and fully cured K-1605R on glass cloth, indicate that this compound is very promising in correcting these previous shortcomings.

Another potential use of the supported fusible tapes is in hot air duct construction. The advantages expected are improved layer-to-layer bonds and improved rubber-to-metal bonds for connections. Another possible use of supported fusible tapes is in the sealing of electronic or heating equipment. For metal adhesion, Chemlok 607 primer and some pressure should be used.

As reported earlier, the K-1605R type of fusible compound can be dispersed easily in organic solvents. These dispersions are useful not only in coating of fabrics but also may be utilized as wash coatings for improving adhesion of other silicone rubbers. In addition, the dip coating of small metal parts, such as coils, would fill the voids, bond to the metal and provide an adherent layer for the final coat. The outer layer may be applied by a second dip or it may be built up by wrapping with a fusible tape.

From preliminary tests, it seems that any application now utilizing a conventional silicone rubber coating compound may well be improved by using a fusible silicone rubber compound.

The fusible silicone rubber compounds can be fabricated the same as conventional silicone compounds. With the fusible compounds, however, it will be possible to

TABLE III—RESISTIVITY OF BLENDS OF A FUSIBLE AND NON-FUSIBLE SILICONE RUBBER

Blend	Mold Cured 20 min./340°F. ohm-cm	Postcured 24 hr./480°F. ohm-cm
100% K-1516	70.4	5.65
90% K-1516 / 10% K-1605R	98.3	11.60
70% K-1516 / 30% K-1605R	$3.02 (10)^2$	43.05
50% K-1516 / 50% K-1605R	$8.20 (10)^6$	$1.05 (10)^5$
30% K-1516 / 70% K-1605R	$1.36 (10)^{15}$	$7.5 (10)^{15}$
10% K-1516 / 90% K-1605R	$4.69 (10)^{15}$	$2.43 (10)^{16}$
100% K-1605R	$1.2 (10)^{16}$	$6.9 (10)^{16}$

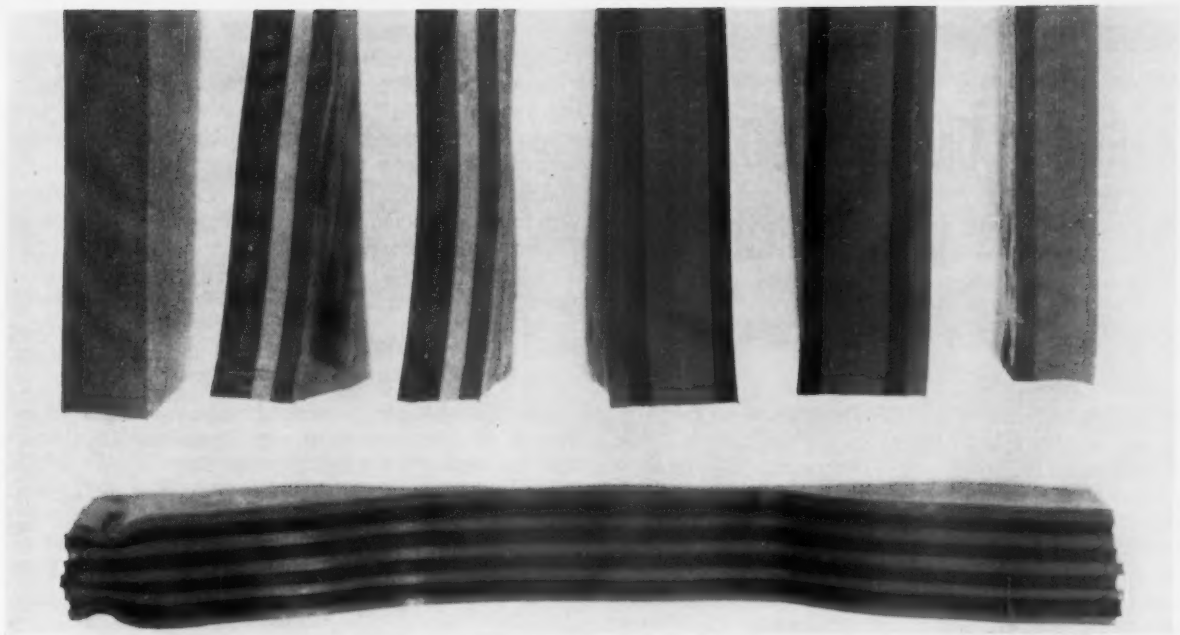


FIG. 3—Cohesive and adhesive fusion of Y-1622 (black color), K-1605R (lighter color), and a regular silicone rubber.

mold and fully cure a part prior to assembling or bonding it. Thus, for example, in making an AN connector, it may be possible to mold the insert, postcure it, and then bond it into the shell.

Figure 3 shows the cohesive and adhesive fusion of Y-1622 (black color), K-1605R (lighter color), and a regular silicone rubber, Union Carbide K-1035. The separate layers were cut from slabs of fully postcured (24 hours at 480°F.) materials. After being pressed together with light pressure and standing for 30 minutes at room temperature, the individual layers could not be separated. The square sections at the top were plied up three days after they were individually postcured. After standing for one hour at room temperature, the plies could not be separated without tearing the rubber. This room temperature fusion of fully cured material again emphasizes the unique character of the fusible compounds.

As was mentioned earlier, the fusible compounds can be extruded, calendered or transfer molded. In the case of extrusions, if the part is to be initially cured and then processed further, the surface should be cleaned with a solvent such as MEK. Bonding of the cleaned part to other silicone rubbers can then be accomplished.

As in the case of the insulating fusible compounds, it is expected that the major uses of the conductive fusible compounds will be in the cable and electronic fields. The Y-1622 conductive fusible compound, as such, can be fabricated into tapes, unsupported or supported. These conductive fusible tapes could be used to wrap electrical equipment where a corona shield or static bleed off is needed. Again, with the use of a silicone primer, excellent adhesion to metal can be attained.

Since the Y-1622 compound can be blended with K-1605R or with the standard silica filled compounds such as K-1035, tapes can be made with varying resistivities but still with fusible properties. These corona precipitators could be tailor-made for each specific application. In preliminary tests, it appears that Y-1622 will also adhere to glass; thus, such uses as external wrapping of cathode ray tubes may be feasible.

Of course, the conductive fusible compounds can be molded or formed in combination with the insulating silicone rubbers, such as the sandwich shown in Figure 3. Maximum adhesion would be obtained by using K-1605R as the insulating rubber.

Although Y-1622 has not been completely evaluated as a dispersion in toluene, preliminary tests indicate that dip coating is possible.

Summary

In summing up, the general unique properties of a new class of fusible silicone rubber compounds were outlined. Unsupported tapes fabricated from these materials bond to themselves on contact. Fusion occurs slowly at room temperature or more rapidly at elevated temperatures or pressures. Supported tapes, fully cured for maximum reversion resistance, have building tack, but they require a heating above 400°F. for fusion.

The preparation of supported and unsupported tapes was reviewed and uses were suggested for these forms. The ability of the fusible compounds to be cured and fabricated by conventional silicone rubber techniques was discussed. An insulating member and a conductive member of this new family were characterized in detail.

Although only two compounds now available on a limited scale were described, laboratory results indicate that other members of this new family, such as higher durometer or low temperature varieties, can be made. This new concept, that of building a pressure-sensitive, fusible property into the elastomer, is certain not only to allow new methods of assembly of fabricated parts, but also to expand the utility of silicone rubber.

Rubber Division, A. C. S., Meets in Cincinnati

THE 73rd meeting of the Division of Rubber Chemistry of the American Chemical Society will be held at the Netherlands Plaza Hotel in Cincinnati, Ohio, on May 14 to 16. The three-day meeting will feature the presentation of 31 technical papers and the showing of a motion picture on the use of high speed photography in the rubber industry. (EDITOR'S NOTE: An article prepared especially for RUBBER AGE on the methods used and results obtained will appear in our May issue.)

Other activities of interest at the meeting will include a luncheon-meeting of the Twenty-Five Year Club, the business meeting, the divisional banquet, and the presentation of an award for the best technical paper delivered at the previous meeting of the Division in New York City in September, 1957.

The technical program for the meeting has been divided into three sessions, each with a general theme. On Wednesday afternoon, May 14, the papers will be on "Urethane Rubbers, Latices, etc." R. F. Dunbrook, Firestone Tire & Rubber Co., Division Chairman, will preside.

The entire day Thursday, May 15, will be devoted to a "Symposium on High Temperature Resistant Elastomers." E. R. Bartholomew, Wright Air Development Center, who organized the symposium, will preside during the morning session, and E. N. Cunningham, Precision Rubber Products Corp., chairman of the Local Arrangements Committee, will serve in the afternoon. Of the 11 papers to be presented during the symposium, the six scheduled for the morning session were invited, while those to be heard during the afternoon were contributed. Two papers on other subjects will conclude the afternoon session.

The final technical session on Friday morning, May 16, will feature papers on "Vulcanization and Reinforcement." S. C. Nicol, Goodyear Tire & Rubber Co., Director-at-Large, will preside.

The motion picture, "High Speed Photography in the Rubber Industry," produced by technical personnel of the Firestone Tire & Rubber Co., will be shown twice, at 11:00 a.m. on Wednesday and at 5:00 p.m. that afternoon after the technical papers are presented. This is a presentation of the use of a high speed camera in the study of materials processing and products testing in the rubber industry.

A business meeting will be held at 11:30 a.m. Thursday, May 15. At this time the Best Paper Award, given to the authors of the most worthy paper delivered at the previous meeting, will be presented to Hugh E. Diem, C. F. Gibbs and Harold Tucker of the B. F. Goodrich Research Center, Brecksville, Ohio, for their paper, "Alkyllithium Polymerization of Isoprene." Changes in the by-laws of the Division will also be voted on, and a report will be heard from the Nominating Committee on proposed officers to serve for the 1958-59 period.

Special attractions arranged for the ladies include a bus tour of Cincinnati with a stopover at the famous Krohn Conservatory, and a boat trip down the Ohio River. For those who do not want to participate in the tour or boat trip, a "Ladies Get Together and Talk" room has been arranged. Registration desks will be provided both in the lobby of the hotel and on the meeting room floor.

In addition to Mr. Cunningham who is acting as chairman of the Local Arrangements Committee, the following are acting as assistant chairmen: J. M. Kelble (Wright Air Development Center), J. R. Wall (Inland Manufacturing) and Fred W. Gage (Dayton Chemical Products). Committee chairmen are: *Finance*, Don N. Bertke (Texo); *Ladies Entertainment*, Boris Sway (Texo); *Hospitality and Information*, W. F. Herberg, Jr. (Dow Corning); *Registration*, R. E. Wells (Precision Rubber Products); *Publicity*, Fred W. Gage (Dayton Chemical Products); *Banquet*, J. M. Williams (Amsco Solvents); *Housing*, C. L. Zimmerman (Zimmerman Co.); *Program and Meeting Rooms*, S. J. Miller (DuBois). H. S. Karch (C. P. Hall) will act as chairman at the luncheon-meeting of the Twenty-Five Year Club.

Abstracts of the papers which will be presented at the meeting follow herewith.

Program of the

DIVISION OF RUBBER CHEMISTRY
AMERICAN CHEMICAL SOCIETY

Netherlands Plaza Hotel, Cincinnati, Ohio
May 14-16, 1958

Wednesday Morning—May 14

9:30 A.M.—Registration.
11:00 A.M.—Motion picture on "High Speed Photography in the Rubber Industry." (Repeated at 5:00 p.m.)
11:30 A.M.—Twenty-Five Year Club Luncheon (H. S. Karch, C. P. Hall Co., Chairman).

Wednesday Afternoon—May 14

2:00 P.M.—Introductory Remarks by R. F. Dunbrook (Firestone), Division Chairman.
2:05 P.M.—Technical Papers—"Urethane Rubbers, Latices, etc."

Thursday Morning—May 15

9:00 A.M.—Introductory Remarks by E. R. Bartholomew (Wright Air Development Center).
9:05 A.M.—Technical Papers—"Symposium on High Temperature Resistant Elastomers".
11:30 A.M.—Business Meeting.

Thursday Afternoon—May 15

2:00 P.M.—Technical Papers—"Symposium on High Temperature Resistant Elastomers" (Cont'd.)
6:45 P.M.—Divisional Banquet.

Friday Morning—May 16

9:00 A.M.—Technical Papers—"Vulcanization and Reinforcement."

Wednesday Afternoon — May 14

Urethane Rubbers, Latices, Etc.

R. F. Dunbrook, Presiding

2:00 P.M.—1—Introductory remarks.

2:05 P.M.—2—Chemistry of Aryl Isocyanates: Rate and Equilibrium Constants for the Formation and Decomposition of Ethyl α,γ-Diarylallophanates. ***I. C. Kogon (Jackson Laboratory, Elastomer Chemicals Department, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.).***

The equilibrium and rate constants for the information of ethyl α,γ-diarylallophanates from aryl isocyanates and ethyl substituted carbanilates at 106 to 143°C. have been measured.

At equilibrium, the concentration of allophanate decreases with increasing temperature. Substitution of a para-methyl group on the aromatic ring of the carbanilate decreases the concentration of allophanate compared to the unsubstituted and ortho-methyl substituted carbanilate.

Similarly, substitution of an ortho-methyl group on the aromatic ring of the carbanilate increases the rate of reaction with phenyl isocyanate compared to the unsubstituted and para-methyl carbanilate. The mechanism of this reaction will be discussed.

Tertiary amines such as n-methyl morpholine do not exert any catalytic effect on the rate of formation of ethyl α,γ-diarylallophanate. Decomposition studies of some aryl biurets and ethyl α,γ-diphenylallophanate show that aryl biurets are less stable than ethyl α,γ-diarylallophanate. Substitution of the aryl group with an alkyl group increases the stability of the biuret.

2:30 P.M.—3—Gelation and Viscosity Control in Isocyanate Reactions. ***R. P. Kane, I. C. Kogon and H. W. Bradley (Jackson Laboratory, Elastomer Chemicals and Organic Chemicals Departments, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.). (Paper will be presented by Mr. Kane).***

It is well known that undesirable gelation reactions in the preparation and storage of liquid polymers from diisocyanates and polyols can be tempered or avoided entirely by judicious employment of acidic additives, e.g., acid chloride. It is known also that gelation reactions are sometimes prevented merely through use of a different lot of the same diisocyanate and for this reason the source of difficulty often has been ascribed to the diisocyanate. The purity of the polyol is also critical. This paper elucidates the interrelationship of the hydrolyzable chlorine content of the diisocyanate with the purity of the polyol. The observed phenomena are illustrated in model compound studies as well as in typical commercial formulations. Methods for avoiding undesirable side reactions are presented.

2:55 P.M.—4—Liquid Urethane Elastomers. ***R. J. Athey (Elastomer Chemicals Department, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.).***

Fluid processing of elastomers has been an important objective in the rubber industry for years. Latices, dispersions or solvent solutions are used to meet most of the current needs for elastomers in liquid form. While these materials allow liquid processing, the problems of removal of water or solvent and lack of unusual properties compared to solid elastomers has limited the development of liquid processing. Advances in polyurethane chemistry have opened the way to a truly fluid polymer which can be transformed to a strong, elastic rubberlike solid having unique properties compared with conventional elastomers.

Adiprene L urethane rubber is an example of this approach to castable elastomers. It can be cast, sprayed, spread, or applied by dipping to produce a wide variety of mechanical goods, protective and decorative coatings. The curing process, which transforms the liquid polymer into a solid elastic rubber, varies from 5 minutes to 24 hours depending on the curing agent and the conditions used.

Adiprene L vulcanizates exhibit high tensile strength and resilience combined with excellent resistance to abrasion, compression set, oils, oxidation and ozone. In addition, they exhibit excellent low temperature properties. The liquid nature of the polymer coupled with the unique combination of vulcanizate properties suggest its use in automated production of high quality rubber goods.

3:15 P.M.—5—Polyurethane Foams: Stability, Collapse and Shrinkage. ***H. K. Frensdorff (Elastomer Chemicals and Organic Chemicals Departments, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.).***

The physical factors affecting foaming behavior in polyurethane foams were studied on non-polymerizing model systems based on polytetramethyleneether glycol (M.W. 3000). The effects of silicone additives on surface tension, foam growth, collapse, bubble size and bubble number were determined.

The results of these studies lead to the following conclusions: Bubble size increases during foaming, and the number of bubbles decreases continually owing to bubble coalescence. Collapse consists of the loss of a comparatively small number of very large bubbles. Silicones, because of their surface activity, delay collapse by decreasing the initial bubble size and by delaying the breaking of very large bubbles. The silicones exert their maximum stabilizinfi effect at very low concentrations, where the Gibbs surface excess is greatest.

Gas permeability measurements showed that polyurethanes were much more permeable to carbon dioxide than to air. When carbon dioxide diffuses out of a freshly prepared urethane foam more rapidly than air diffuses back into it, a pressure differential results, which causes shrinkage of the as yet incompletely cured foam.

3:40 P.M.—6—Effect of Swelling on Properties of Elastomers. ***C. B. Griffis, Angus Wilson and J. C. Montermoso (Quartermaster Research and Engineering Center, U. S. Army, Natick, Mass.). (Paper will be presented by Mr. Griffis).***

Measurements of volume increases of rubbers in liquids are often used as an indication of the change in properties of the rubbers in these liquids. Volume increase measurements are of little significance per se, unless the physical dimensions of a rubber component or item are critical. To be of value the swell measurements should disclose accompanying changes in the physical properties of the rubber. The studies reported here were undertaken to determine possible mathematical statements showing such relationships.

Various types of rubber compounds of different states of cure were immersed in standard test fluids and in mixtures of methanol with benzene and ketone. After swelling equilibrium had been reached the per cent swell, tensile strength, ultimate elongation, hardness and tear strength were determined. Per cent losses in these properties were plotted against corresponding volume increases. Equations were found relating losses in physical properties to swell. They were of the form

$$L = \frac{s}{as + b}$$

for all properties, where "L" is per cent loss in the property tested, "s" is per cent volume increase, and "a" and "b" are constants for a specific rubber compound. The values of "a" and "b" were found to vary between types of rubber, different cures of the same type of rubber, and the property tested.

A method is described for determining the change in certain physical properties of a given rubber item immersed in liquids when test samples cannot be cut from the item.

4:00 P.M.—7—The St. Joe Ozone Flex Tester for Rubber Compounds. ***L. E. Carlson and R. S. Havenhill (Rubber Research Laboratory, St. Joseph Lead Co., Monaca, Penna.). (Paper will be presented by Mr. Carlson).***

A new laboratory machine for evaluating the ozone resistance of rubber compounds under static and dynamic conditions is described. The machine is compact (17 inches high, 12 inches square base) and tests small specimens (½ x 1 inch) easily obtainable from standard tensile sheets.

The ozone concentration, of approximately 50 parts per hundred million, is maintained constant by passing a controlled quantity of compressed air (which is ozone free) past a Westinghouse No. 794 Sterilamp.

Five specimens are alternately flexed 10 minutes and maintained in the bent position 50 minutes by an automatic cycling device. The dynamic feature is considered essential, since some additives which improve static ozone resistance actually accelerate dynamic attack. The human element in rating degree of attack has been eliminated by measuring bend modulus before and after exposure with a special beam balance.

Electrostatic contact potential of rubber oriented by stretching is shown to be more negative than for unstretched rubber. This could account for the more rapid ozone attack on stretched rubber.

Results obtained with the new machine have shown good correlation with actual road tests on white sidewall tires in the Los Angeles area.

4:25 P.M.—8—The Influence of Particle Size on the Viscosity of Synthetic Latex: Effect of Polydispersity. *Paul H. Johnson and Robert H. Kelsey (Firestone Tire & Rubber Co., Akron, Ohio). (Paper will be presented by Mr. Johnson).*

Three latices, made in modifications of a single system using a 70/30 butadiene/styrene charge, possessed modal particle diameters, as determined with the electron microscope, of 950Å, 1710Å and 325Å, respectively. The distribution of particles was contained in a sufficiently narrow range (ca. 700Å) so that the mode adequately represented the particle population. These latices were concentrated alone and in various blend ratios of small, medium and large particles. Viscosities were run on the latices with a Brookfield viscosimeter during the course of concentration. The viscosity behavior was normal and conformed to the well known principle that larger particle size latices are more fluid than those of small particle size.

The influence of particle size distribution was examined by making blends of the latices in various combinations of sizes. Blends of 950Å with 3250Å diameters were made on an equal mass basis and on an equal surface basis. The mixtures had more favorable viscosity characteristics than did either of the single latices. The blend on an equal surface basis could be taken to 67.5% solids.

Other experiments involving blends of widely different number distribution showed that the mass relationship of large and small particles gave a more significant indication of the viscosity behavior. The results of viscosity measurements on various blends showed that favorable viscosity is dependent upon (1) particle size—the larger the particles the more fluid is the latex, and (2) particle size distribution. The difference between large and small particles should be large and the mass of large should constitute around 75% of the total mass of particles.

4:45 P.M.—9—The influence of Particle Size on the Viscosity of Synthetic Latex: Effect of Particle Spacing. *Robert H. Kelsey and Paul H. Johnson (Firestone Tire & Rubber Co., Akron 17, Ohio). (Paper will be presented by Mr. Kelsey).*

From the simple geometric considerations of particle size and mean particle spacing, a relation between particle sizes in synthetic latices and the concentration limited by viscosity has been deduced for substantially monodisperse systems. An approximation to the Brookfield viscosity versus concentration relation has been made from the mean particle spacing, using only one arbitrary constant.

A packing constant which holds its value well for a range of essentially monodispersed latices has been defined. It was found that it could be evaluated in any case from the volume concentration of polymer at which the viscosity increased beyond measure. This volume concentration has been found very close to 74% for latices of uniform particle size. For latices having two principal sizes of particles, the packing constant assumed values corresponding generally to closer packing.

The use of the packing constant determined from the limiting concentration permitted satisfactory fit between the viscosity-concentration curves for mixed latices, experimentally determined and deduced from particle spacing data, with the use of one arbitrary constant.

Thursday Morning — May 15

Symposium on High Temperature Resistant Elastomers: Part I

E. R. Bartholomew, Presiding

Note: The six papers delivered at this session are all invited papers.

9:00 A.M.—10—Introductory remarks.

9:05 A.M.—11—Properties of Elastomers up to 550°F. *F. M. Smith (Chemical and Physical Research Laboratories, Firestone Tire & Rubber Co., Akron 17, Ohio).*

Industrial and military applications are subjecting elastomeric materials to ever-increasing temperatures, necessitating a knowledge of the heat resistance of currently available compounds and the development of still higher heat resistance.

Stress-strain properties for compounds of nineteen elastomers were measured at temperatures up to 550°F. The initial loss of tensile strength at elevated temperatures was differentiated from that caused by a combined aging and temperature effect. Tear strength was measured at temperatures up to 500°F. Shore A hardness was measured at room temperature on blocks which had been aged one hour and eight hours at temperatures as high as 500°F. Resilience was measured over the —40°F. to +500°F. range by a falling ball rebound test. Low temperature elastic properties of compounds can be anticipated from the temperature at which the minimum rebound occurs. Permeability of elastomers to air varied as much as one thousand-fold at room temperature, but no more than twenty-fold at 350°F.

The data presented should serve as a guide to the usefulness and limitations, at high temperatures, of the nineteen elastomers tested.

(A major portion of this work was conducted under USAF Contracts AF33(616)-3108 and AF33(616)-3953 which were administered under the direction of the Materials Laboratory, Directorate of Research, Wright Air Development Center.)

9:30 A.M.—12—Viton—Heat and Fluid Resistant Elastomer. *W. V. Freed (Elastomer Chemicals Department, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.).*

The high performance requirements of today's advanced design in aircraft and automotive applications have exceeded the limits of operability of conventional elastomeric materials. A new synthetic rubber, Viton, has been developed to overcome many of the environmental problems of heat, corrosion and chemical resistance. This fluorine-containing elastomer possesses excellent chemical and thermal stability with remarkable retention of elastomeric properties after prolonged exposures to temperatures in the range of 400 to 600°F. Resistance to attack by a wide variety of fluids, including aromatic and aliphatic hydrocarbons, hydraulic fluids, chlorinated solvents and mineral acids and alkalies, has been clearly demonstrated.

Viton is fully processable by conventional elastomer techniques, and many viton moldings have been successfully tested under extreme exposure conditions in aircraft, automotive and industrial applications. The conditions and results of these tests are described. Seals and gaskets of all types have received the widest attention because of the need for an elastomer flexible above 400°F. in a variety of fluids. Investigations directed toward the development of chemical resistant hose, bladder type fuel cells, protective clothing, and aircraft tires will be discussed.

9:55 A.M.—13—Combined Effects of Heat and Gamma Radiation on Practical Rubber Compounds. *J. W. Born, E. E. Mooney and S. T. Semegen (B. F. Goodrich Co. Research Center, Brecksville, Ohio). (Paper will be presented by Mr. Born).*

A study is underway of the separate and combined effects of heat and gamma radiation on practical rubber compounds. Two representative stocks were chosen for each of four major classes of aircraft products, namely, hose, seals, fuel cells, and wire insulation. Two recipe variations of each rubber compound were also included, involving separate incorporation of two potential

radiation damage inhibitors. The elastomers were neoprene, styrene rubber and nitrile rubber.

Stress-strain and hardness measurements were employed to evaluate physical deterioration. The study involved gamma irradiations up to 126 x 10^6 ergs per gram of carbon and physical testing at room temperature and 158°F. This work has involved four sets of test conditions and is the first phase of continuing research intended to involve temperatures of 212° and 280°F.

The importance of equivalent cure was emphasized. The principal changes resulted from radiation exposure ranging up to 85 x 10^6 ergs per gram of carbon at room temperature and 34 x 10^6 at 158°F. Based on the exposure required to reduce the initial ultimate elongation by one half, the additives appear to give greater protection during irradiation at room temperature than at 158°F.

10:20 A.M.—14—Behavior of Some Elastomers in Petroleum Base Fuel at Elevated Temperatures. *R. G. Spain (Wyandotte Chemicals Corp., Wyandotte, Mich.).*

The degree of the recovery of physical properties of elastomer compounds after exposure to petroleum base fuels does not form a basis for the estimation of the physical properties of the compound while at the conditions of aging. Equipment and procedures have therefore been developed to determine the physical properties of elastomer compounds at the simulated use conditions of fuel immersion at elevated temperatures.

Data are presented for compounds based on Hycar 1041, Kel-F 3700, and Viton A from conventional fuel aging tests and from tests conducted at elevated temperatures. High temperature testing was conducted in the presence and absence of petroleum base fuel to differentiate between the degradation of physical properties due to solvency and thermal effects.

The effects of compounding variations for fluoro-elastomers is discussed, with emphasis on compounds prepared with a variety of curing agents.

10:45 A.M.—15—The Vulcanization of Butyl Rubber with Phenol Formaldehyde Derivatives. *P. O. Tawney, J. R. Little and P. Viohl (Research Center, United States Rubber Co., Wayne, N. J.). (Paper will be presented by Mr. Viohl).*

It is a well recognized fact that during the vulcanization of butyl rubber with sulfur two competing reactions are occurring: (1) cross-linking or vulcanization and (2) reversion or devulcanization. We have found that an extremely stable cross-link is formed by vulcanizing butyl rubber with 2,6-dimethyl-4-hydrocarbylphenols or condensation polymers derived therefrom.

Butyl rubber vulcanized in a conventional fashion with sulfur plus an ultra accelerator such as tetramethylthiuram disulfide reverts rapidly when vulcanization temperatures exceed 320°F. Butyl rubber vulcanized with the phenolic condensation polymers referred to above show no tendency to revert even though vulcanization temperatures are extended over a considerable period. The rate of vulcanization of butyl rubber by phenolic condensation polymers is slow; however, a number of catalytic agents can be used to speed up the vulcanization reaction. The amount of phenolic condensation polymer, the amount of catalyst, and the polymer unsaturation all have a bearing on state of cure.

It is estimated that the upper temperature limit of serviceability of butyl rubber may be increased by 100°F. through the use of this vulcanization system.

11:10 A.M.—16—High Temperature Resistance of Bonded Polymer to Metal Assemblies (400 to 450°F.). *Stewart L. Brams and Frederick W. Gage (Dayton Chemical Products Laboratories, Inc., West Alexandria, Ohio). (Paper will be presented by Mr. Brams).*

The high temperature resistance of bonded assemblies involving Viton A and butyl rubber stocks bonded to metal during vulcanization has been examined. Viton A stocks were compounded according to conventional techniques. The butyl stocks were compounded with the so-called resin cure, for high temperature resistance of the stock itself. The test procedure employed was an empirical test devised by the authors some years ago, which has been termed the adhesion distention test. In this test a section of rubber is bonded to two steel plates sandwich fashion, using press cure, whereupon the two plates are forced apart with screws to get some percentage elongation with sizeable tension on stock and bond. The convenient assembly so produced can be subjected to all sorts of tests, and in the present work they were exposed to high temperatures in an oven, to prolonged soaking in hot fluids, and combinations. Highly adequate resistance of bond to exposures up to 96 hours at 400° and 450°F. has been observed, both in synthetic lubricants and in hot air. Correlatively, the resistance of such stocks to these conditions while under a functional magnitude load has been confirmed.

11:30 A.M.—Business Meeting.

Thursday Afternoon — May 15

Symposium on High Temperature Resistant Elastomers: Part II

E. N. Cunningham, Presiding

2:00 P.M.—17—A New Chlorine-Containing Elastomer. *L. T. Eby and J. V. Fusco (Enjay Co., Inc., Elizabeth, N. J.). (Paper will be presented by Mr. Eby).*

A new isobutylene copolymer containing a small amount of chlorine is being established as a useful high temperature polymer in the rubber industry. The activity of this new elastomer toward vulcanization closely resembles that of the highly unsaturated rubbers. The main chain is made up of the repeating neopentyl structure derived from isobutylene. About one to two per cent of the monomer units are derived from isoprene and halogen, giving about 1.2% of chlorine in the polymer by weight.

The reactive allylic chloride structure provides a number of different possible vulcanization systems. Some are associated with the halogen, some with the double bond, and some with both. Because of its reactivity and polarity, this new elastomer is compatible with other elastomers such as the highly unsaturated rubbers and neoprene.

Zinc oxide alone will act as a vulcanizing agent to give cross-links with unusual stability. The addition of 0.5 to 1.0 phr of tetramethylthiuram disulfide greatly increases cure rate and provides vulcanizates with excellent thermal stability. This system may be modified with small amounts of magnesium oxide and benzothiazyl disulfide to improve aging and scorch safety. Fast cure rates with broad cure plateau are typical for this new elastomer. Compression set, compression flexing, ozone resistance and abrasion resistance are outstanding.

Other vulcanizing agents for this elastomer are primary diamines, quinone dioximes, and polymethylolphenols. The polymethylolphenols react similarly with this elastomer as with highly unsaturated rubbers in that the reaction is fast and direct with the polymer, without the addition of halogen-containing reagents for activation.

2:25 P.M.—18—Natural Rubber Compounds for High Temperature Service in Air. *W. P. Fletcher and S. C. Fogg (British Rubber Producers' Research Association, Welwyn Garden City, Herts., England). (Paper will be presented by Mr. Fletcher).*

Demands for elastomers which are suitable for service at temperatures above 200°C., e.g., for military applications, have focused attention on a number of expensive actual or hypothetical polymers. Such specialized requirements, important though they may be, should not be allowed to conceal the fact that a vastly greater volume of rubber products is needed for service at temperatures in the 100 to 125°C. range. For this region of use it is possible, by special compounding, to provide natural rubber compounds with aging properties similar to the best attainable with other general purpose rubbers.

Two types of vulcanizing system have been examined, first "sulfurless" thiuram sulfide and, secondly, peroxide. In the former case, earlier indications of the profound protective action of the dithiocarbamate formed *in situ* has prompted an

investigation into the effects upon heat aging of various added dithiocarbamates, and of dithiocarbamates formed by use of metal oxides other than zinc for cure activation. Further protection may be afforded to such vulcanizates by use of selected antioxidants, and if retention of tensile strength and extensibility are of paramount importance an additional measure of heat aging resistance is conferred by the use of chemicals of the imidazole class. Different combinations of the various protective agents and of fillers are found to enhance different aging properties, e.g., tensile strength retention, modulus constancy and hot compression set.

Thiuram sulfide curing systems convenient for vulcanization at or below 100°C. are also outstanding for heat aging and appear capable of further protection by the techniques discussed above. These offer a new order of heat resistance to products manufactured from latex.

Published data indicate that dithiocarbamates are powerful protective agents for peroxide vulcanizates in high temperature air aging. Technological tests confirm this for dicumyl peroxide and by addition of the antioxidants and imidazole found advantageous for thiuram stocks, peroxide vulcanizates with excellent heat aging performance at 100 to 125°C. have been produced.

2:50 P.M.—19—Inflatable Seals for High Temperature Service. *M. A. Nadler, D. Alkire, W. A. Carr and F. J. French (North American Aviation, Inc., Downey, Calif.). (Paper will be presented by Mr. Nadler).*

Inflatable elastomer seals were used to a great extent in the Navaho missile, making it possible to employ lightweight structure for the sealing glands, thereby effecting substantial weight savings over configurations necessitating heavy flanges and bolt loads. The anticipated temperature environment in one developmental stage was such that pneumatically inflated silicone rubber gaskets would perform adequately. However, special precautions had to be taken in the cure of the seals in order to obtain sufficient reversion resistance under the confined sealing gland conditions.

Further development stages with even more severe temperature requirements led to the development of a liquid cooled neoprene inflatable gasket with a silicone rubber sealing member. This configuration took advantage of the superior mechanical properties of neoprene rubber for the main body of the seal, utilizing the superior heat resistance of silicone rubber in the sensitive contact areas.

The paper discusses design and constructional features of the seals, considerations in selection of materials employed, curing schedules for attainment of desired properties, testing methods used to simulate service conditions for the seals, and results of such tests.

3:15 P.M.—20—Melting and Glass Transitions in Polyisobutylene. *R. M. Kell, B. Bennett and P. B. Stickney (Battelle Memorial Institute, Columbus, Ohio). (Paper will be presented by Mr. Kell).*

It is known that polyisobutylene and copolymers of isobutylene such as butyl rubber, can be caused to crystallize under stress. However, there is no conclusive evidence in the literature of crystallization in unstressed polymers of these types.

We have exposed several types of polyisobutylene and butyl rubber in dilatomers to temperatures ranging down to —60°C. for times up to eighteen months. Two types of isobutylene homopolymers, Vistanex L-100 and L-140, were observed to crystallize spontaneously in five to ten days at temperatures from —25° to —42°C. The maximum rate of crystallization appears to occur at about —33°C. Samples crystallized in this temperature range and melted by slowly raising the temperature became completely amorphous at about 0°C.

The observed melting point must be a fair approximation to the melting point of unstressed butyl rubber. One sample of butyl rubber, GR-I-35, became crystalline after more than one year at about —30°C., but other butyl rubbers remained amorphous during the one and one-half years exposure period.

3:35 P.M.—21—Behavior of Silicone Rubber in Sealed Systems at High Temperatures. *W. J. Bobear (Silicone Products Department, General Electric Co., Waterford, N. Y.).*

A study has been completed on the performance of silicone rubber in sealed systems at elevated temperatures. The principal types of commercially available silicone compounds were observed for changes in durometer, tensile strength and elongation at 300° and 480°F. Because of the unusual sensitivity of results to test variables, it was necessary to develop new test methods to yield reproducible results. These methods are described.

The data produced show that change in hardness alone is not a reliable measure of the performance of silicone rubber in high temperature sealed systems. Data also point out the importance of proper choice of the basic gum, type of filler, and catalyst system. The significance of curing technique and environmental variables are indicated. The new facts presented will permit better selection of silicone rubber stocks, and will also serve as guides to their proper fabrication and application in sealed systems.

GENERAL PAPERS

4:00 P.M.—22—Compression Set of Silicone Rubber. *C. W. Roush and S. A. Braley, Jr. (Dow Corning Corp., Midland, Mich.). (Paper will be presented by Mr. Roush).*

The upper service temperature limit of seals and gaskets is often established by the compression set resistance of the sealing material. The introduction of silicone rubber extended the service temperature range as compared to other synthetic rubbers. Continued compounding studies have resulted in further improvement in compression set resistance.

Compression set resistance is influenced by the combined effects of all ingredients in the formulation. It is the purpose of this paper to describe the effects of gum composition, fillers, vulcanizing agents and various additives. It is shown that substitution of vinyl groups on a dimethylpolysiloxane polymer results in improved compression set resistance. Further, the proper choice of fillers and vulcanizing agents will result in lowest compression set and also shorten the oven post cure necessary to obtain the lowest compression set.

4:25 P.M.—23—Polymer Composition versus Low Temperature Characteristics of Polysiloxane Elastomers. *K. E. Polmanteer and M. J. Hunter (Dow Corning Corp., Midland, Mich.). (Paper will be presented by Mr. Polmanteer).*

Low temperature studies were performed on elastomers prepared from polysiloxane copolymers. The dimethylsiloxane content ranged from 100 down to 0 mole per cent. Principal attention was given to the phenylmethylsiloxane-dimethylsiloxane copolymers in determining the effect of polymer composition on low temperature characteristics. Pendant groups other than phenyl are also discussed.

Like other copolymers, the stiffening temperature was found to be dependent upon the composition of the base polymer. Stiffening of the elastomers was due to crystallization in some cases and second order transition in others. For those siloxane polymers and copolymers that crystallized, the process was very rapid. Only one eutectic point was found in the PhMeSiO-Me_2Sio copolymer system. Introducing small amounts (i.e., up to 5 M % PhMeSiO) of bulky pendant groups in the dimethylsiloxane system showed that: (a) supercooling could be accomplished, (b) crystallization was increasingly more difficult, and (c) the extent of crystallization was reduced. With added amounts of the bulky side groups, a molar concentration was reached that eliminated crystallization, and low temperature stiffening was due to nearness to the second order transition temperature. The amount of second component needed to achieve the low temperature eutectic point was found to be dependent upon the specific organic pendant groups used. For example, a molar concentration of 7.5 per cent of PhMeSiO was needed.

The unique low temperature characteristics of polysiloxane elastomers are explainable on the basis of three factors. These are: (1) very flexible molecules, (2) low temperature coefficient of viscosity over a broad temperature range including low temperatures, and (3) copolymerizability of dimethylsiloxane with bulky pendant group containing siloxanes which inhibit crystallization by breaking up the regularity of the building units of the molecules.

Friday Morning — May 16

Vulcanization and Reinforcement

S. C. Nicol, Presiding

9:00 A.M.—24—Pore Sizes and Pore Size Distribution in Reinforcing Pigment Particles. ***Andries Voet (J. M. Huber Corp., Borger, Texas).***

The presence of pores in the particles of a pigment generally influences its reinforcing characteristics in elastomers. Pores which are too small to allow rubber molecules to penetrate add to the surface area of pigments without contributing to reinforcement. Accelerators and other chemicals, however, could be removed from the matrix by adsorption in the pores.

The measurement of pore sizes and pore size distribution for pores in diameters above about 40 Å have been made by means of an analysis of adsorption-desorption isotherms of gases. For pores of diameters above 70 Å, the mercury porosimeter provides reliable data.

A new approach to the measurement of pore sizes and pore size distribution has been developed for pores in the range below 40 Å, the gas adsorption isotherms of which do not show any hysteresis. The analysis is based upon the difference in nitrogen adsorption at —196° C. between porous and non-porous pigments at pressures of 0.20 to 0.50 per cent of saturation. The data obtained appear to be consistent with practical results. Thus, EPC channel black and most furnace blacks are non-porous, MPC and HPC channel blacks are slightly porous, while oxidized color blacks have a marked porosity in the 20 to 40 Å range. Pore sizes and pore size distributions of different silica pigments vary markedly.

9:25 A.M.—25—Influence of Carbon Black Type and Loading on Temperature-Retraction Properties of Elastomeric Compounds. ***Fred W. Barlow and Robert W. Cretney (Thermatomic Carbon Co., Sterlington, La.). (Paper will be presented by Mr. Barlow).***

Temperature-retraction relationships of five commonly used blacks have been studied in smoked sheet, neoprene, butyl rubber, cold rubber and nitrile rubber. Blacks chosen were typical medium thermal, fine thermal, semi-reinforcing furnace, high abrasion furnace and easy processing channel blacks. Loadings were 25, 50, 75 and 100 parts. Tests were conducted with the elongation being increased by 50% steps until all samples broke in the clamps. With the particular grades of polymers used, smoked sheet showed the best low temperature-retraction properties, followed by butyl rubber, cold rubber, neoprene and Paracril. This assessment was based on the 50% elongation results which are probably of greatest practical interest.

It was observed that lower temperature retraction values were found with the larger particled blacks such as medium thermal and fine thermal. Increasing the black loading raises the temperature of retraction, but the increase for the same increase in loading is much greater for the fine particled blacks like high abrasion furnace than it is for coarse blacks like medium thermal. The spread in temperature-retraction (T-R) values with loading is also influenced by the polymer used. As the test elongation is increased crystallization increases with the crystallizable polymers. It appears that the amount of crystallization is influenced by the type of black used. Finer particled blacks induce more crystallization, high abrasion furnace being particularly effective in causing this change.

9:50 A.M.—26—Odd Electrons in Rubber Reinforcing Carbon Blacks. ***Gerard Kraus and R. L. Collins (Phillips Petroleum Co., Bartlesville, Okla.). (Paper will be presented by Mr. Kraus).***

The number of unpaired electrons in several rubber reinforcing blacks has been determined by quantitative electron spin resonance assay. The odd electron concentrations are of the order of 10^{18} to 10^{20} spins/gram. These concentrations are consistent with the negative (diamagnetic) net magnetic susceptibility of the blacks.

Oxygen and other paramagnetic substances, even in extremely minute quantities, exert a powerful influence on the electron spin resonance observed. Their effect is to broaden the resonance line and this reduces considerably the signal intensity. In extreme cases the intensity may be reduced to the noise level; in less severe instances the broadening may lead to erroneously low spin assays. Carbon blacks differ in their susceptibility toward line broadening effects.

Evidence is presented for a correlation between the odd electron concentration of carbon blacks and the modulus they impart to rubber, suggesting a combination reaction between the carbon black radicals and polymeric free radicals formed during processing or vulcanization. The possibility of such a reaction is supported by electron spin resonance measurements on carbon blacks heated in the presence of rubber, both with and without curatives.

On the basis of the results available it is not possible to ascertain the full importance of the odd electrons of carbon black in elastomer reinforcement. It is certain that the unpaired electrons are not necessary for the development of reinforcement effects in general, although they may increase them substantially by providing an additional intraction mechanism for the union of black and rubber.

10:15 A.M.—27—A Theoretical Treatment of Elastomer Rupture. ***Laura E. Case and L. C. Case (Purdue University, Lafayette, Ind). (Paper will be presented by Mr. Case).***

A new model is proposed for the prediction of rupture extensibilities of elastomers. The model consists of a "tree" or network of branched random walks. The mathematical expression corresponding to the model is a modified Gaussian distribution.

The rupture elongations of elastomers are predicted to be dependent upon the cross-link density, the functionality of the branch points, and the distribution of chain lengths between branch points. For random cross-linking, the fractional extension at rupture is predicted to be equal to

$$\sqrt{\frac{3}{2\ln[1 + p(F-2)]}},$$

where p is the fraction of the chain links that are branched, and F is the functionality of the branch points. For uniform chain distances between branches, the rupture extension is predicted to be

$$\sqrt{\frac{3}{2p\ln(F-1)}}.$$

10:40 A.M.—28—Direct Determination of Combined Sulfur in Rubber Vulcanizates. ***W. J. Dermody (Electric Storage Battery Co., Philadelphia, Penna.).***

A method is described for the determination of combined sulfur in pure gum rubber vulcanizates by extracting uncombined sulfur, accelerator residues and other extraneous organic materials using a binary azeotrope of benzol and methanol, oxidizing the polymer residue with nitric acid and potassium chlorate and determining sulfur gravimetrically as barium sulfate.

Extraction efficiency of the recommended azeotrope is exemplified and compared to acetone and aqueous sodium sulfite. Possibilities for error due to volatile loss during extraction, over extraction of combined polysulfide sulfur or retention of solvent in the specimen or extract after extraction and drying are discussed.

Superiority of direct determination to indirect computation based on separate determination of free and total sulfur is claimed and precision of the recommended method assessed.

A new term—polymer linked sulfur—is introduced to identify a parameter which will adequately characterize the properties of vulcanizates in terms of a combined sulfur value independent of extraneous materials in the mixture and directly determinable by analysis of the vulcanizate.

11:05 A.M.—29—The Temperature Coefficient of Vulcanization of Butyl Rubber: Effect of Accelerator System and Polymer Unsaturation. *J. G. Martin and R. F. Neu (Enjay Laboratories, Linden, N. J.). (Paper will be presented by Mr. Neu).*

This paper is a study of the effect of the accelerator system, degree of polymeric unsaturation, as well as the method of cross-linking on the temperature coefficient of vulcanization (TC) of butyl rubber. This temperature coefficient is a measure of the dependency of the rate determining reaction of vulcanization upon the cure temperature.

This study uses two different methods based on simple laboratory techniques in determining a value of TC for butyl rubber of 1.37 for a change in curing temperature of 10°F. It shows further that the coefficient is independent of the unsaturation level of the various grades of butyl rubber, and that except for certain dialkyl dithiocarbamates, it is independent of the accelerator system used. This last statement is in contrast with the 32 per cent difference in the coefficient for natural rubber for a variety of its accelerators. The data used in this study show certain trends in the reversion of butyl rubber cures, and these are recorded as a reference source for future work.

Use of these temperature coefficient and reversion data, together with previously published information on the thermal diffusivity of butyl rubber compounds, permits the choice of proper curing times and temperatures for an article of any given size and shape.

11:30 A.M.—30—Vulcanization of Elastomers by Electron Beam Irradiation. *H. A. Winkelmann (Dryden Rubber Division, Sheller Manufacturing Corp., Chicago, Ill.)*

Vulcanization of natural and styrene rubber, neoprene, nitrile rubber and polyurethane rubber by irradiation with beta rays, using a one MEV electron beam generator, is an important advance in rubber technology. When properly compounded, these elastomers can be cured at room temperature to give good vulcanizates in ten to thirty seconds. Beta rays have a high intensity but low penetration. The optimum thickness of the rubber compound for beta ray curing using a one MEV generator is one-tenth to one-eighth inch.

Irradiation of uncompounded natural rubber and styrene rubber deteriorates the polymers, due to scission, resulting in a tacky, uncured product. Neoprene and nitrile rubber when irradiated alone give a poor cure that is dry.

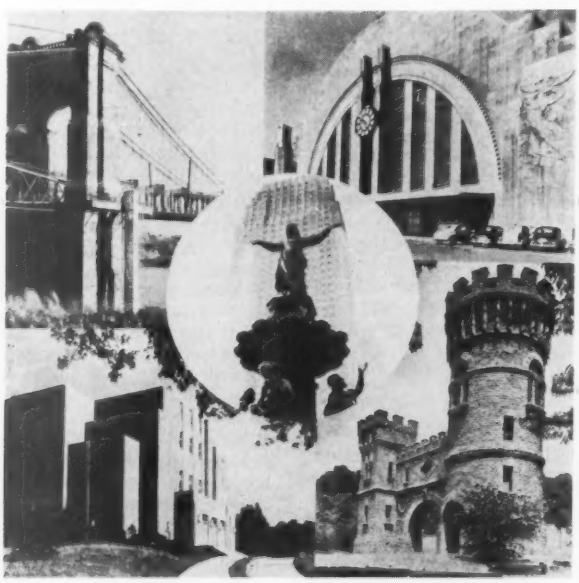
Reinforcing carbon blacks are the only fillers that give good physical properties with these elastomers. It is not necessary to use sulfur, accelerator, etc., to obtain good cures with natural rubber, styrene rubber or nitrile rubber. Neoprene may be cured without magnesium oxide or zinc oxide. Mineral fillers and other compounding ingredients in all elastomers give low tensile strength as well as a tacky surface and porosity. Neoprene and nitrile rubber show less tackiness than natural rubber or styrene rubber. Good cures can be obtained by adding mineral fillers to a compound containing reinforcing carbon blacks. The elongation of beta ray cures shows a tendency to decrease rapidly with increase in dosage. This can be overcome by using extenders such as Cumars, petroleum hydrocarbons (Picco), and mineral rubber. Sulfur will combine, at room temperature, with natural rubber by irradiation with beta rays. Oil resistance of elastomers is generally improved.

Outdoor exposure tests show that some compositions of natural rubber and peoprene, cured with beta rays, have not cracked after 870 to 900 days.

11:50 A.M.—31—Chemical Loaded Molecular Sieves as Latent Curing Aids. I. Secondary Accelerators in Styrene-Butadiene Rubber. *F. M. O'Connor, T. L. Thomas and M. L. Dunham (Union Carbide Corp., Tonawanda, N. Y.). (Paper will be presented by Mr. O'Connor).*

Rapid curing rubber and thermosetting plastics formulations that have good processing and storage characteristics are of considerable interest to compounders. A novel product which imparts properties of rapid cure and safe processing has been developed. The combination of a Linde molecular sieve and an active compound, held within the structure of the molecular sieve by adsorptive forces, produces a unique temperature-sensitive curing aid. The active compound is isolated from the system during the processing and storage steps but is released from the molecular sieve at the elevated vulcanization or curing temperature to function in its normal manner. Very active compounds can be used to obtain fast cure rates without sacrificing processing safety or pot life.

This technique is being used commercially in the vulcanization of silicone elastomers with di-tertiary butyl peroxide. Extensive laboratory investigations have shown that this principle can also be applied in the curing of a variety of organic rubber and plastics formulations, including styrene rubber, natural rubber, neoprene, epoxy resins, and rigid vinyl plastisols. This paper presents data to illustrate the latent curing aid principle and describes the use of amine-loaded molecular sieves as secondary accelerators in styrene rubber. Amine-loaded molecular sieves are latent secondary accelerators for thiazole type primary accelerators, either alone or in combination with conventional secondary accelerators.



Points of interest in Cincinnati

Low Cost Compounding with Oil-Extended Rubber

The lower cost of Polysar Krynol 651 (staining oil masterbatch) and 652 (non-staining oil masterbatch) often enables a compounder to reduce his costs and maintain the quality of his compounds or to improve the quality without increasing the cost. To better understand why this is possible, the basic differences between Polysar Krynol 651 and Polysar Krylene (cold rubber) are outlined, along with a brief history of the development of the former. To illustrate how lower cost compounds can be achieved, a detailed compounding study is presented comparing Polysar Krynol 651 and Polysar Krylene. Some typical application recipes are appended to show the practical uses of Polysar Krynol 651 and 652.

By Z. J. DORKO and H. A. PFISTERER

Research and Development Division,
Polymer Corporation Limited, Sarnia, Ontario, Canada

STYRENE rubber consists of polymer chains with a broad range of molecular weights. Fractionation studies by Yanko *(1)*, Johnson *(2)*, and Beatty and Zwicker *(3)* revealed that the low molecular weight fractions do not contribute but actually detract from the vulcanizate strength of styrene rubber compounds. The low molecular weight material is necessary, however, to provide satisfactory commercial handling, i.e., mixing and processing of the compounded stocks.

Earlier work had been pioneered by Fritz S. Rostler to show that both natural rubber *(4)* and styrene rubber *(5)* could be extended with by-products of oil refining without pronounced deterioration of the tensile strength of the vulcanizates and yet with improvement in the processing of the compounded stock. The advent of cold rubber, which permitted the production of gel-free high molecular weight rubber, enabled the industry to put to practical use the implications of the above studies. The low molecular weight portion of styrene rubber could be replaced by low cost extender oils to provide easy processing, while the physical properties could be maintained by using higher molecular weight polymer.

The theoretical aspects of rubber-oil black masterbatch systems have been discussed by McLeod and Einhorn *(6)*. The studies of Harrington, Weinstock, Legge and Storey *(7)* and Weinstock, Storey and Sweeley *(8)* describe the practical development and the physical properties of oil-enriched rubbers. Polymer Corporation was the first synthetic rubber producer to accomplish commercial exploitation of this development with the production of Polysar Krynol, starting in late 1950, and Polysar Krynol NS, following in mid-1951 *(9)*.

That oil masterbatch polymers have won acceptance by the rubber industry, and are finding ever increasing use, is shown by the U.S. production figures illustrated in Figure 1.

The tire industry was the first to take advantage of the lower cost of the oil masterbatch polymers on an extensive scale. Road tests showed that equal or better road wear could be obtained with the oil masterbatch polymers than with cold rubber *(10)*. Recent tests conducted by Polymer Corporation have shown the equivalence of Polysar Krynol 651 (staining oil masterbatch) and Polysar Krylene (cold rubber) in road wear *(11)*. The results of laboratory tests comparing these two rubbers in typical tread recipes are shown in Table I.

The cost advantage of Polysar Krynol 651 need not be restricted to this application and has indeed been exploited by many manufacturers for soling, weatherstrip, mechanical goods, as well as for many other uses The recent modification of Polysar Krynol to Polysar Krynol 651, an easier processing rubber *(11)*, facilitates its adaptation to a wider range of end uses. Lighter oils and better non-staining antioxidants have been incorporated into Polysar Krynol 652, the non-staining counterpart of Polysar Krynol 651, to further extend the usefulness of this rubber.

Experimental Procedure

To demonstrate the basic difference between Polysar Krynol 651 (staining oil masterbatch) and Polysar Krylene (cold rubber) an estimate of the molecular weight distribution was obtained by fractionation and solution viscosity measurements of the fractions. Breakdown characteristics of Polysar rubbers have been reported previously *(12)* and included those of Polysar Krynol

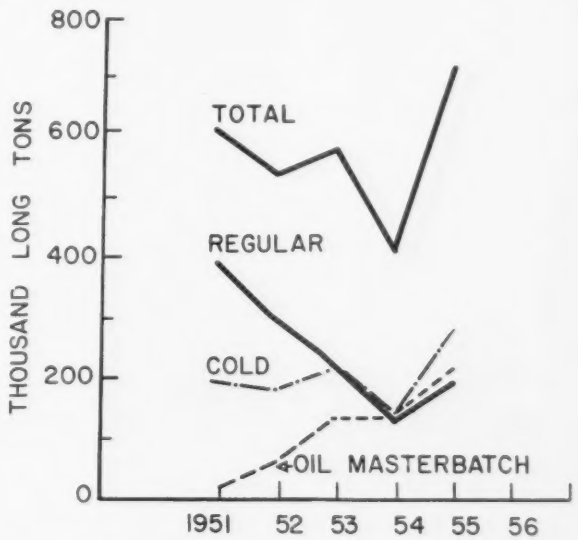


FIG. 1—U. S. production figures for general purpose type polymers, 1951-56.

Note: This paper was presented before the Ontario Rubber Group, Preston, Ontario, Canada, November 12, 1957.

TABLE I—COMPARISON OF POLYSAR KRYNOL 651 (STAINING OIL MASTERBATCH) AND POLYSAR KRYLENE (COLD RUBBER) IN TREAD STOCKS

RECIPE

	Parts by weight
Polysar Rubber	100.0
ISAF carbon black	45.0
Zinc oxide	3.0
Stearic acid	1.5
Flexamine	1.0
Liquid asphalt	2.0
Curatives	as shown

Compound	A	B
Rubber	Polysar Krynol 651	Polysar Krylene
Santocure	0.70	1.00
DPG	0.14	0.20
Sulfur	1.27	1.75
Cure time (min. @ 292°F.)	50	50
Hardness, Shore A_2 (30 sec.)	50	54
Modulus @ 300% elongation (psi)	1200	1500
Tensile strength (psi)	3400	3800
Elongation @ break (%)	640	550
Tear strength (lbs./in.)	350	430
Wendes flex (Kcy./in.)	47	52
Heat build-up (°F.) (Goodrich Flexometer)	77	86

and Polysar Krylene. The breakdown of Polysar Krynol 651 was determined in a similar manner.

The compounding study was designed to illustrate the economies available with Polysar Krynol 651 (staining oil masterbatch) and to show the differences in compound and vulcanizate properties when compared with Polysar Krylene (cold rubber). Compounds were prepared with various carbon blacks, the loadings of which were adjusted to give vulcanizates of 60 Shore A_2 hardness. The effect of increased plasticizer loadings on compounds maintained at 60 Shore A_2 hardness by adjustment in carbon black loading was studied with two of the carbon blacks, ISAF and SRF. To determine whether savings could be effected with Polysar Krynol 651 when low cost pigments were used, three different volume loadings of a hard clay were compounded with both rubbers.

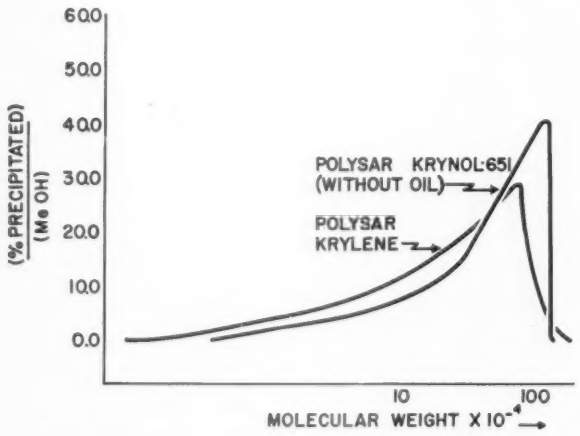


FIG. 2—Comparison of molecular weight distribution of Polysar Krynol 651 (staining oil masterbatch) and Polysar Krylene (cold rubber).

TABLE II—EFFECT OF VARIOUS CARBON BLACKS ON POLYSAR KRYLENE (COLD RUBBER) COMPOUNDS—60 SHORE A_2

RECIPE

	Parts by weight
Polysar Krylene	100.0
Zinc oxide	4.0
Stearic acid	2.0
Santoflex AW	1.5
Paraflux R	8.0
DPG	0.3
Santocure	1.2
Sulfur	2.0
Carbon black	as shown

Compound No. 7-S-	403	404	405	406	407	408
Type of black	SAF	HAF	FEF	EPC	FT	MT
Amount of black (phr)	42.5	47.5	42.5	50.0	100.0	115.0
Specific gravity (measured)	1.14	1.17	1.15	1.17	1.30	1.33
Pound volume cost ($)	0.225	0.208	0.207	0.208	0.188	0.173
Compound viscosity						
ML-4 @ 212°F.	63	57	51	64	49	56
ML-4 @ 292°F.	47	39	31	48	28	31
Mooney scorch (min. @ 292°F.)	17	18	20	24	20	23
Extrusion						
Speed (in./min.)	111	151	160	110	144	173
Die swell (%)	130	100	90	101	112	77
CURE TIME: 40 min. @ 307°F.						
Hardness Shore A_2 (inst.)	64	62	60	62	62	62
Hardness Shore A_2 (30 sec)	58	58	53	57	52	56
Stress-Strain @ 77°F.						
100% Modulus (psi)	410	430	400	430	270	360
300% Modulus (psi)	2150	2400	1800	2300	800	1200
Tensile strength (psi)	3500	3180	2720	3000	1820	1650
Elongation @ break (%)	440	400	420	380	600	510
Tear strength (lbs./in.)	480	520	480	490	270	320
Stress-Strain @ 212°F.						
100% Modulus (psi)	360	320	420	490	260	340
Tensile strength (psi)	1330	1430	1120	1130	480	710
Elongation @ break (%)	260	290	250	200	380	200
Tear strength (lbs./in.)	230	230	250	230	140	170
CURE TIME: 70 min. @ 307°F.						
Rebound @ 77°F. (%)	54	58	63	55	58	62
Compression set (%) (70 hrs. @ 158°F.)	12	11	10	11	11	12

The mixing was done in a Model B Banbury, rotor speed 77 rpm, according to the following schedules:

BLACK COMPOUNDS

(Temperatures of rotors and gates set at 290°F., steam off.)

0 min. . . . add polymer
½ min. . . . add zinc oxide, stearic acid and antioxidant
1 min. . . . add one-half of the carbon black
1½ min. . . . add plasticizer (in a polyethylene bag)
2½ min. . . . add remaining black
3½ min. . . . brush down ram
4 min. . . . dump, sheet out and cool
Add curatives on a cold mill.

CLAY COMPOUNDS

(Temperatures of rotors and gates set at 200°F., steam on.)

0 min. . . . add rubber
½ min. . . . add stearic acid, zinc oxide, Cumar MH 2½, wax and antioxidant
1 min. . . . add one-half of the clay, turn the steam off
3 min. . . . add the triethanolamine and other one-half of the clay
5 min. . . . brush down the ram
6 min. . . . dump, sheet out and cool
Add curatives on a cold mill.

Testing was done using ASTM test methods or slight modifications thereof.

TABLE III—EFFECT OF VARIOUS CARBON BLACKS ON POLYSAR KRYNOL 651 (STAINING OIL MASTERBATCH) COMPOUNDS—60 SHORE A_2

RECIPE

	Parts by weight
Polysar Krynol 651	100.0
Zinc oxide	3.0
Stearic acid	1.5
Santoflex AW	1.5
Paraflux R	4.0
DPG	0.2
Santocure	0.9
Sulfur	1.5
Carbon black	as shown

Compound No. 7-S-	391	392	393	394	395	396
Type of black	SAF	HAF	FEF	EPC	FT	MT
Amount of black (phr)	45	52.5	60	55	125	140
Specific gravity (measured)	1.09	1.18	1.19	1.15	1.34	1.32
Pound volume cost ($)	0.190	0.174	0.169	0.174	0.156	0.140
Compound viscosity						
ML-4 @ 212°F.	46	46	52	52	43	41
ML-4 @ 292°F.	32	30	30	35	28	25
Mooney scorch time (min. @ 292°F.)	18	18	18	21	18	22
Extrusion						
Speed (in./min.)	162	201	216	157	163	207
Die swell (%)	89	54	39	74	66	45
CURE TIME: 40 min. @ 307°F.						
Hardness, Shore A_2 (inst.)	61	61	62	62	60	58
Hardness, Shore A_2 (30 sec.)	50	52	55	50	50	49
Stress-Strain @ 77°F.						
100% Modulus (psi)	250	330	530	290	230	290
300% Modulus (psi)	1300	1750	1920	1270	530	850
Tensile strength (psi)	3300	2860	2380	2850	1190	1270
Elongation @ break (%)	550	460	390	550	640	610
Tear strength (lbs./in.)	350	380	380	370	210	280
Stress-Strain @ 212°F.						
100% Modulus (psi)	240	300	430	180	180	200
Tensile strength (psi)	1160	1370	1350	1150	390	660
Elongation @ break (%)	330	290	250	360	440	370
Tear strength (lbs./in.)	190	210	220	230	120	150
CURE TIME: 70 min. @ 307°F.						
Rebound @ 77°F. (%)	48	53	55	52	51	58
Compression set (%) (70 hrs. @ 158°F.)	16	14	12	16	15	13

TABLE IV—EFFECT OF CARBON BLACK ON POLYSAR KRYLENE (COLD RUBBER) COMPOUNDS WITH VARYING PLASTICIZER LOADINGS—60 SHORE A_2

RECIPE

	Parts by weight
Polysar Krylene	100.0
Zinc oxide	4.0
Santoflex AW	1.5
Stearic acid	2.0
DPG	0.3
Santocure	1.2
Sulfur	2.0
Carbon black	as shown
Circosol 2XH	as shown

Compound No. 7-S-	409	410	411	412	413	414
Type of black	ISAF	ISAF	ISAF	SRF	SRF	SRF
Amount of black (phr)	42.5	47.5	60	62.5	70	95
Circosol 2XH (phr)	8	15	30	8	15	30
Specific gravity (measured)	1.16	1.15	1.20	1.19	1.21	1.23
Pound volume cost ($)	0.214	0.204	0.186	0.196	0.185	0.164
Compound viscosity						
ML-4 @ 212°F.	56	48	37	48	39	36
ML-4 @ 292°F.	38	32	25	28	23	22
Mooney scorch (min. @ 292°F.)	19	20	25	22	23	23
Extrusion						
Speed (in./min.)	155	162	240	163	200	252
Die swell (%)	96	90	51	93	70	43
CURE TIME: 40 min. @ 307°F.						
Hardness, Shore A_2 (inst.)	63	59	58	59	56	55
Hardness, Shore A_2 (30 sec.)	57	51	49	52	52	49
Stress-Strain @ 77°F.						
100% Modulus (psi)	400	340	270	430	340	370
300% Modulus (psi)	2300	1850	1600	1750	1650	1500
Tensile strength (psi)	3280	3150	2420	2330	2250	2020
Elongation @ break (%)	370	400	390	420	440	480
Tear strength (lbs./in.)	450	430	410	450	410	380
Stress-Strain @ 212°F.						
100% Modulus (psi)	410	310	220	340	380	370
Tensile strength (psi)	1680	1310	1420	1130	1210	1260
Elongation @ break (%)	190	270	330	230	270	270
Tear strength (lbs./in.)	240	250	200	250	210	210
CURE TIME: 70 min. @ 307°F.						
Stress-Strain @ 77°F.						
Compression set (%) (70 hrs. @ 158°F.)	11	9	8	12	11	12

Results and Discussion

The differences in molecular weight distribution of Polysar Krynol 651 (staining oil masterbatch) and Polysar Krylene (cold rubber) are clearly shown in Figure 2. The proportion of high molecular weight chains in the former is greater, with much less low molecular weight material present.

The breakdown results are shown in Figure 3. The breakdown of Polysar Krynol 651 is essentially the same as that of Polysar Krynol *(12)* under the test conditions used. In all cases the Polysar Krynol 651 breaks down faster and to a lower Mooney than does Polysar Krylene. In fact, in the hot Banbury without peptizer the Mooney of Polysar Krylene actually increases, indicating that the cross-linking reaction predominates over the chain scission reaction.

The recipes and test results are shown in Tables II to VII inclusive. Note that the curatives have been reduced by about 25% for Polysar Krynol 651 compounds to compensate for the presence of the extender. Comparing Polysar Krylene (cold rubber) and Polysar Krynol 651 (staining oil masterbatch) with various blacks (Tables II and III respectively) it can be seen that:

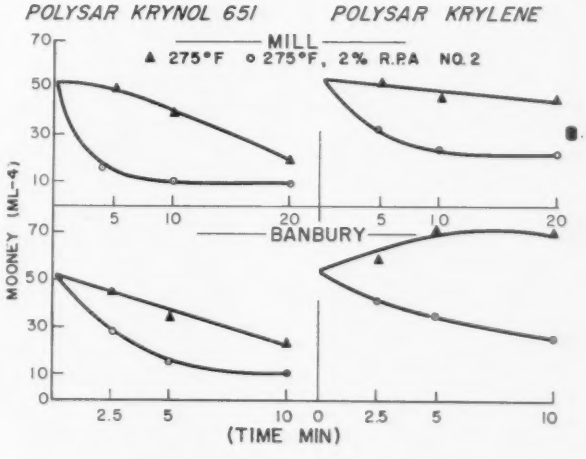


FIG. 3—Breakdown characteristics (mill and Banbury) of Polysar Krynol 651 (staining oil masterbatch) and Polysar Krylene (cold rubber).

TABLE V—EFFECT OF CARBON BLACK ON POLYSAR KRYNOL 651 (STAINING OIL MASTERBATCH) COMPOUNDS WITH VARYING PLASTICIZER LOADING—60 SHORE A_2

RECIPE

	Parts by weight
Polysar Krynol 651	100.0
Zinc oxide	3.0
Stearic acid	1.5
Santoflex AW	1.5
DPG	0.2
Santocure	0.9
Sulfur	1.5
Carbon black	as shown
Circosol 2XH	as shown

Compound No. 7-S-	397	398	399	400	401	402
Type of black	ISAF	ISAF	ISAF	SRF	SRF	SRF
Amount of black (phr)	47.5	60	72.5	80	95	122.5
Circosol 2XH (phr)	4	15	30	4	15	30
Specific gravity (measured)	1.15	1.13	1.15	1.21	1.22	1.25
Pound volume cost ($)	0.181	0.167	0.155	0.159	0.145	0.131
Compound viscosity						
ML-4 @ 212°F.	43	40	39	42	37	34
ML-4 @ 292°F.	32	32	31	27	24	22
Mooney scorch time (min. @ 292°F.)	22	18	21	17	19	21
Extrusion						
Speed (in./min.)	212	234	279	202	249	278
Die swell (%)	51	42	21	49	31	20
CURE TIME: 40 min. @ 307°F.						
Hardness, Shore A_2 (inst.)	59	62	61	60	58	58
Hardness, Shore A_2 (30 sec.)	49	48	49	50	50	50
Stress-Strain @ 77°F.						
100% Modulus (psi)	270	230	220	390	400	390
300% Modulus (psi)	1580	1450	1400	1450	1410	1330
Tensile strength (psi)	3210	2600	2420	1920	1750	1530
Elongation @ break (%)	510	540	480	450	450	410
Tear strength (lbs./in.)	390	370	330	360	340	300
Stress-Strain @ 212°F.						
100% Modulus (psi)	190	170	130	350	300	310
Tensile strength (psi)	1400	1380	1240	1180	1230	1090
Elongation @ break (%)	330	400	460	270	290	330
Tear strength (lbs./in.)	210	210	270	190	200	200
CURE TIME: 70 min. at 307°F.						
Rebound @ 77°F. (%)	51	44	39	55	52	44
Compression set (%) (70 hrs. @ 158°F.)	16	15	18	12	12	14

(a) The cost of the Polysar Krynol 651 compounds is appreciably lower.

(b) The amount of carbon black required to maintain 60 Shore A_2 is higher for Polysar Krynol 651 than Polysar Krylene; this difference decreases as the particle size of the carbon black decreases.

(c) The compound viscosities of the Polysar Krynol 651 compounds are lower.

(d) The Mooney scorch is essentially the same for both polymers.

(e) The linear rate of extrusion of the Polysar Krynol 651 compounds is markedly higher and the die swell is appreciably lower than for the corresponding Polysar Krylene compounds.

(f) The modulus, tensile strength and tear strength are lower while the elongation at break is higher for the Polysar Krynol 651 compounds. The same relative differences exist when the stress-strain is measured at 212°F. instead of 77°F. One notable exception is with FEF carbon black, in which case the modulus of the Polysar Krynol 651 compound is higher than for the FEF loaded Polysar Krylene compound.

(g) The rebound values for the Polysar Krylene compounds are approximately 5% higher, and the compression set figures 3% lower than for the corresponding Polysar Krynol 651 stocks.

When larger quantities of plasticizers are added to the compounds (Tables IV and V) the differences in extrusion characteristics are less pronounced. As the amount of added plasticizer increases, differences in compound Mooney between Polysar Krynol 651 (staining oil masterbatch) and Polysar Krylene (cold rubber) compounds tend to disappear. This also holds true for modulus and elongation. The tensile strength values of the Polysar Krynol 651 compounds decrease more than those of the Polysar Krylene compounds as the plasticizer is increased. The rebound and compression set figures of the Polysar Krynol 651 compounds are also more adversely affected by additional plasticizer.

Selected compounds were air aged for 70 hours at

TABLE VI—EFFECT OF AIR AGING ON COMPOUNDS WITH CARBON BLACK

Compound No. 7-S-	403	391	406	394	408	396	413	401
Polysar Krylene (cold rubber)	100.0	—	100.0	—	100.0	—	100.0	—
Polysar Krynol 651 (staining oil masterbatch)	—	100.0	—	100.0	—	100.0	—	100.0
Type of Black	SAF	SAF	EPC	EPC	MT	MT	ISAF	ISAF
Amount of Carbon Black (phr)	42.5	45.0	50.0	55.0	115.0	140.0	70.0	95.0
Amount of Plasticizer (phr)	8.0	4.0	8.0	4.0	8.0	4.0	15.0	15.0
Cure time: 40 min. @ 307°F.								
UNAGED PROPERTIES								
Hardness Shore A_2 (inst.)	62	60	61	60	62	58	58	57
Modulus at 100% elong. (psi)	410	250	430	260	370	300	340	380
Tensile strength (psi)	3500	3250	3000	2850	1600	1240	2220	1760
Elongation at break (%)	450	580	470	570	500	580	450	450
CHANGE ON AGING IN AIR FOR 70 HOURS @ 250°F.								
Hardness Shore A_2 (inst.) (pts.)	+ 9	+ 16	+ 12	+ 18	+ 10	+ 16	+ 9	+ 16
Modulus at 100% elong. (%)	+120	+260	+144	+370	+130	+180	+162	+230
Tensile strength (%)	— 42	— 42	— 31	— 31	— 22	— 3	— 13	+ 4
Elongation at break (%)	— 62	— 69	— 68	— 73	— 64	— 69	— 60	— 65

TABLE VII—EFFECT OF DIXIE CLAY LOADINGS ON COMPOUNDS

RECIPE

	Parts by weight
Polysar Rubber	100.0
Cumar MH 2½	5.0
Stearic acid	2.0
Zinc oxide	4.0
Santoflex AW	1.0
Triethanolamine	2.0
DPG	0.5
Santocure	2.0
Sulfur	2.0
Dixie Clay	as shown

Compound No. 7-S	547	548	549	541B	542B	543B
Rubber	Polysar Krylene (cold rubber)			Polysar Krynol 651 (staining oil masterbatch)		
Dixie Clay (phr)	78	130	180	78	130	180
Specific gravity (calculated)	1.33	1.49	1.60	1.33	1.49	1.60
Specific gravity (measured)	1.36	1.52	1.64	1.32	1.48	1.60
Pound volume cost (¢)	19.60	17.60	16.00	16.10	14.50	13.20
Compound viscosity (ML-4 @ 212°F.)	23.00	35.00	57.00	20.00	25.00	40.00
Mooney scorch time (min. @ 292°F.)	11.00	13.00	12.00	13.00	14.00	12.00
CURE TIME: 20 min. @ 307°F.						
Hardness, Shore A_2 (inst.)	62	72	80	45	56	65
Hardness, Shore A_2 (30 sec.)	52	57	68	36	50	64
100% Modulus (psi)	330	370	500	140	260	370
300% Modulus (psi)	640	670	800	230	340	540
Tensile strength (psi)	2230	2530	2290	1470	2020	1620
Elongation @ break (%)	590	610	580	580	640	590
Tear strength (lbs./in.)	240	250	280	130	170	240

TABLE VIII—HARD CELLULAR SOLING COMPOUND

RECIPE

Polysar SS-250	70.0
Polysar Krynol 652 (non-staining oil masterbatch)	30.0
Hil-Sil 233	30.0
Dixie Clay	60.0
Cumar MH 2½	5.0
Zinc oxide	3.0
Stearic acid	1.0
Circo light process oil	5.0
AgeRite Stalite	1.0
Mapico Red No. 297	2.0
Mapico Lemon Yellow	3.0
Diethylene glycol	1.0
Triethanolamine	2.0
Leather odorant	trace
Vulcacel BN	3.0
Monex	0.25
Altax	1.0
Sulfur	2.5
Oleic acid	2.0
Compound viscosity (ML-4 @ 212°F.)	58

CURE DATA

Press: 15 inch diameter ram, @ 1800 psi ram pressure.
Mold size: 5 inches x 5 inches x 0.120 inch at bottom, sides bevelled at 45° angle.
Blank weight: 78-80 gm.

	Press Cured 12 min. @ 307°F	Post Cured 4 hr. @ 212°F in air	Air Aged 14 days @ room temperature
Density	0.75	0.87	0.90
Hardness, Shore A_2 (inst.)	78.00	87.00	86.00
Ross flex cut growth (0.01 in./kcy.)	—	0.20	0.14

Reference: Polysar Technical Report No. 5:9-B, P. C. Mayer.

TABLE IX—LIGHT COLORED SOLES AND HEELS COMPOUNDS

RECIPES

	Parts by weight	
Polysar SS-250	—	20.00
Polysar Krynol 652 (non-staining oil masterbatch)	100.00	80.00
Hi-Sil 233	35.00	45.00
Pulpro White	30.00	30.00
Dixie Clay	30.00	50.00
Diethylene glycol	2.00	2.00
Titanium dioxide	10.00	20.00
Zinc oxide	5.00	4.00
Stearic acid	1.50	1.00
Crystex (insoluble sulfur)	2.00	2.00
Monex	0.50	0.25
MBTS	1.50	—
Santocure	—	0.75
Compound No. 5-S-	94	79
Specific gravity	1.46	1.54
Pound-volume cost ($)	0.21	0.20
Compound viscosity (ML-4 @ 212°F.)	73.00	97.00
Mooney scorch time (min. @ 292°F.)	6.00	7.00
Cure time (min. @ 307°F.)	5.00	10.00
Hardness, Shore A_2 (inst.)	68.00	85.00
Modulus @ 100% elongation (psi)	260.00	270.00
Modulus @ 300% elongation (psi)	540.00	530.00
Tensile strength (psi)	1660.00	1530.00
Elongation @ break (%)	530.00	670.00
Compression set (%) (ASTM Method B 22 hr. @ 158°F.)	19.00	41.00
Ross flex cut growth (0.01 in./kcy.)	0.226	—
Rebound (%)	—	35.00

Reference: Polysar Technical Report No. 6: 1-A and 6: 3-C, R. W. Rand.

TABLE X—NUCLEAR SOLING COMPOUND

RECIPES

	Parts by weight as shown	
Polysar rubber	8.0	
Cumar MH 2½	55.0	
Hi-Sil 233	15.0	
Dixie Clay	1.8	
Mapico Red	1.0	
Antioxidant	5.0	
Zinc oxide	1.0	
Stearic acid	1.0	
Paraffin wax	5.0	
Solka Floc BW-200	2.0	
Diethylene glycol	1.5	
Altax	0.3	
Methyl Tuads	2.5	
Sulfur		
Compound No.	4-S-91	7-S-162
Polysar SS-250	40.00	50.00
Polysar Krynol 652 (non-staining oil masterbatch)	—	50.00
Polysar Krylene NS	60.00	—
Specific gravity	1.29	1.29
Pound-volume cost ($)	0.229	0.217
Compound viscosity (ML-4 @ 212°F.)	88.00	53.00
Mooney scorch time (min. @ 292°F.)	14.00	20.00
Cure time (min. @ 307°F.)	20.00	20.00
Hardness, Shore A_2 (inst.)	95.00	97.00
Modulus @ 100% elongation (psi)	580.00	540.00
Modulus @ 300% elongation (psi)	1050.00	1020.00
Tensile strength (psi)	2520.00	2130.00
Elongation @ break (%)	530.00	550.00
Ross flex cut growth (0.01 in./kcy.)	0.46	0.28

Reference: Polysar Technical Report No. 6: 4-C, Z. J. Dorko.

TABLE XI—WRINGER ROLL COMPOUND

RECIPE

	Parts by weight
Polysar Krynol 652 (non-staining oil masterbatch)	100.00
Zinc oxide	4.00
Stearic acid	1.50
Silene EF	63.00
Titanox AMO	5.00
Forum 40	10.00
Diethylene glycol	2.00
ESEN	1.00
Monex	0.25
Altax	1.25
Sulfur	1.50

Compound No.	7-S-540
Specific gravity (measured)	1.22
Cost per pound ($)	0.14
Pound-volume cost ($)	0.17
Compound viscosity (ML-4 @ 212°F.)	41.00
Mooney scorch time (min. @ 292°F.)	6.00
Cure time (min. @ 307°F.)	5.00
Hardness, Shore A_2 (inst.)	48.00
Modulus @ 300% elongation (psi)	230.00
Tensile strength (psi)	1100.00
Elongation @ break (%)	680.00
Tear strength (lbs./in.)	120.00
Tensile set (%)	34.00
Compression set (%) (ASTM Method B 22 hrs. @ 158°F.)	32.00

Reference: Polysar Technical Report No. 6:5-B, Z. J. Dorko.

250°F. The results, in Table VI, show that Polysar Krynol 651 compounds increase more in hardness and modulus, while the tensile strength change and elongation at break change are similar to Polysar Krylene compounds.

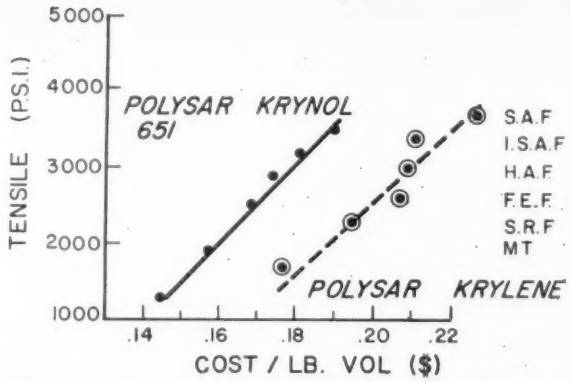


FIG. 4—Relation of cost to tensile strength in Polysar Krynol 651 (staining oil masterbatch) and Polysar Krylene (cold rubber) as determined by selection of carbon black.

The low temperature properties of two compounds of each rubber were measured using the Gehman test. The results listed below show no difference in this property between the two rubbers:

Compound No.	7-S-403	7-S-391	7-S-413	7-S-401
Polysar	Krylene (cold rubber)	Krynol 651 (staining oil masterbatch)	Krylene (cold rubber)	Krynol 651 (staining oil masterbatch)
Carbon Black	SAF	SAF	SRF	SRF
Plasticizer (phr)	8.0	4.0	15.0	15.0
Freeze point (°F.)	—56.2	—57.3	—54.2	—56.6
T10 (°F.)	—40.0	—40.9	—42.9	—42.1
T100 (°F.)	—51.3	—53.1	—53.1	—52.6

The savings possible with Polysar Krynol 651 (staining oil masterbatch) can be more readily seen by plotting the tensile strength versus cost of the various compounds. With the different carbon blacks, about 2.5 cents per pound volume savings is realized at equivalent tensile

TABLE XII—FAST CURING COMPOUND

RECIPE

	Parts by weight		Parts by weight
Polysar Krynol 652 (non-staining oil masterbatch)	100.00	Paraffin wax	3.00
Mineral rubber	10.00	ISAF carbon black	55.00
Cumar P-25	10.00	Dixie Clay	30.00
Zinc oxide	10.00	Whitetex	30.00
Stearic acid	1.00	Sulfur	0.75
AgeRite Stalite	1.50	Methyl Tuads	2.00
		MBTS	1.00

Compound No.	7-S-376
Pound-volume cost ($)	0.17
Compound viscosity (ML-4 @ 212°F.)	48.00
Mooney scorch time (min. @ 292°F.)	6.00

			ASTM Spec. R-712B	Change after aging 70 hrs. @ 158°F.			ASTM Spec. R-712B
Curing temperature (°F.)	307	355	390.0	—	307	355	390	—
Cure time (min.)	5	2	0.5	—	5	2	0.5	—
Hardness, Shore A_2 (inst.)	70	67	70.0	70±5	+ 2 pt.	+ 3 pt.	+ 3 pt.	+10 pt.
Tensile strength (psi)	1500	1660	1590.0	1200	0	— 4%	— 3%	—25%
Elong. @ break (%)	400	380	410.0	200	—27%	—26%	—32%	—35%

Reference: Polysar Technical Report No. 6. 1-C, Z. J. Dorko.

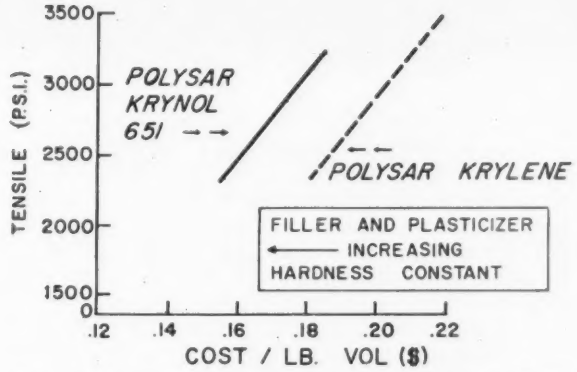


FIG. 5—Relation of cost to tensile strength in Polysar Krynol 651 (staining oil masterbatch) and Polysar Krylene (cold rubber) as determined by use of ISAF black.

strength (Figure 4). With ISAF carbon black and increasing plasticizer loading (Figure 5) the cost-tensile lines for the two rubbers are parallel with at least a 2 cent advantage for Polysar Krynol 651. When a softer carbon black (SRF) and an increasing plasticizer loading is used, one cost-tensile line can be drawn for both rubbers (Figure 6). Thus, with the last system, savings can only be achieved if lower tensile strength can be tolerated.

The results obtained with the hard clay as filler show (Table VII) that the cost advantage can be maintained with Polysar Krynol 651 even in the very low cost compounds. The recipes shown in Tables VIII to XIII inclusive illustrate how the savings with Polysar Krynol 651 and 652 (non-staining oil masterbatch) can be realized in practical applications.

Summary and Conclusion

Polysar Krylene (cold rubber) provides higher tensile strength, modulus and tear strength and lower elongation than does Polysar Krynol 651 (staining oil masterbatch). The rebound of the former is higher and the compression set slightly lower. The extrusion speeds of the Polysar Krynol 651 compounds are faster and the die swell is lower. The low temperature properties of the two rubbers

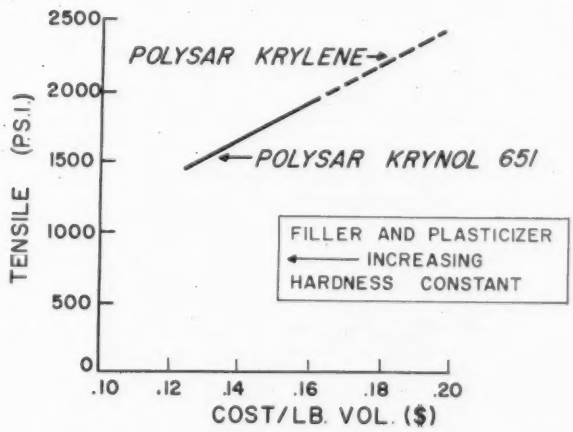


FIG. 6—Relation of cost to tensile strength in Polysar Krynol 651 (staining oil masterbatch) and Polysar Krylene (cold rubber) as determined by use of SRF black.

TABLE XIII—TRANSLUCENT SOLING COMPOUND

RECIPE

	Parts by weight
Polysar Krynol 652 (non-staining oil masterbatch)	100.0
Decelox	2.0
Monex	0.3
Santocure	1.5
Ultra Silteg VN-3	60.0
Diethylene glycol	2.0
Polar 45	6.0
Sulfur	2.5
Compound No.	7-S-264

Specific gravity	1.2
Cure time (min. @ 307°F.)	40.0
Hardness, Shore A_2 (inst.)	72.0
Modulus @ 300% elongation (psi)	470.0
Tensile strength (psi)	2510.0
Elongation @ break (%)	760.0
Compression set (%) (22 hrs. @ 158°F.)	54.0

Reference: Polysar Technical Report No. 6: 2-C, W. S. Edwards and Z. J. Dorko.

are similar. Polysar Krynol 651 compounds harden slightly more on severe hot air aging but do not decrease in tensile strength or elongation at break to any greater extent.

Because of the lower cost of the Polysar Krynol 651 compounds, savings of 2 to 3 cents pound volume can be realized at an equivalent tensile strength. These savings are possible even with low cost pigments such as hard clay. The same savings can be expected with the use of Polysar Krynol 652 (non-staining oil masterbatch) in place of Polysar Krylene NS.

Some typical application recipes are included to show the practical significance of these studies. They show how low cost compounds can be developed using Polysar Krynol 651 and Polysar Krynol 652.

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Editorials..

Breaking the Log Jam

► At this writing, the price of No. 1 Ribbed Smoked Sheets stands at 26½¢ a pound. Because of current economic factors, world stocks of natural rubber stand at the highest point in years. What with this glut on the market, it does not seem likely that the price of natural rubber will move upward within the next few months. On the other hand, there are some indications that a period of near-stability is at hand. And over the horizon stands the "bugaboo" of the natural rubber stockpile.

In last month's editorial, we took occasion to cite some of the points made by H. E. Humphreys, Jr., chairman of the board of the U.S. Rubber Co., in his address before the tenth anniversary meeting of the Washington Rubber Group. Mr. Humphreys commended the Stockpile Advisory Committee of the Office of Defense Mobilization for recommending a three-year stockpile base for natural rubber, stating that a three-year base is more realistic than the five-year supply we have been maintaining. Mr. Humphreys went on to say that if an even smaller stockpile was considered enough by the military people, he would be in favor of it.

Back in November of 1957, we estimated that the natural rubber stockpile in the United States amounts to about 1,200,000 long tons valued at well over $1 billion. We ventured the opinion, at that time, that the natural rubber stockpile would not be substantially reduced so long as the cold war continued. We based this reasoning on several factors. For one, the State Department is apparently opposed to any movement of the stockpile which would affect the economies of Far Eastern countries. Secondly, the military argument is advanced that in the event of a nuclear attack and the destruction of synthetic rubber producing facilities, we would still have the natural rubber stockpile to fall back on.

It is no secret that ever since World War II ended, natural rubber producers have not been in a race to see who could produce the most natural rubber. No adverse judgment should be made of this point as the natural rubber producer has been caught in an increasingly difficult situation. Politically, he has been caught in a rising tide of nationalism. Economically, he has been trapped by competition from synthetics. Practically, he has been troubled by the machinations of the market. Under these conditions he has been loathe to make a move to radically alter the manner in which he operated for so many years.

In the United States, the synthetic rubber plants moved from government to private ownership. Research brought forth the natural-like synthetic rubbers. Where the natural rubber producer was once only faced with the "minor" problems of politics and economics, he was now faced with an opponent of a radically different nature—technology. How to face this matter? Well, a temporary balm has been the lack of plant capacity to produce the natural-like synthetics. That will take a few years. And after that, another few years before the price of natural-like synthetics become competitive. Looks like clear sailing for at least five years.

What has been happening, however? A reappraisal of the situation seems to be entering the scene. This is a reappraisal born not of conference or agenda, but by a subtle shift in opinion. No longer do we speak of a five-year stockpile; we seem to accept the idea of a three-year stockpile. Political difficulties in Indonesia and elsewhere in the rubber producing areas are not susceptible to solution from the United States. European countries are making increasing investments in synthetic rubber producing facilities. These are the hard facts of the situation. It seems to us that some action must now be taken to bring a degree of clarity to the situation.

Now that the Stockpile Advisory Committee of the Office of Defense Mobilization has made its recommendation of a three-year level for the natural rubber stockpile, it behooves our government to give some official status to this proposal. That is to say, the three-year stockpile should be adopted as an official government policy. This will enable the rubber producer and the rubber consumer to more accurately gauge the problem.

Secondly, the amount of rubber involved in a three-year stockpile should be published. It will come as no great surprise to the Russians to know the quantities of rubber involved in the U.S. stockpile. Semi-official figures have been circulated for years and we cannot believe that the Soviet is unaware of the quantities involved.

If we accept at face value the theory that 1,200,000 long tons of natural rubber in stockpile are a necessity for a five-year wartime period, are we now to assume a three-year level is equal to 720,000 long tons? It would be of immense value to know exactly what is involved and it is extremely doubtful if this information would bring much comfort to the Soviet.

Thirdly, the type of economy under which we operate calls for free competition in a free marketplace. Protectionism on one hand, or intimations of "dumping" on the other hand, make impossible the workings of the system. If natural and synthetic are to compete, then each must be produced and sold at the most economic level. The marketplace cannot and has not ever sustained incompetence and "do-nothing-ism." Political exigencies must not ever be permitted to thwart technological advance—we all lose in the process. What we propose, briefly, is this:

1—Make the three-year natural rubber stockpile the "official" policy of our government.

2—Reveal the actual amounts of rubber involved in this program and take the necessary steps either for the reasoned disposal of excess quantities or to acquire the quantities needed.

3—Permit the operations of a free market within the framework of rules geared to accomplish only one thing —military security.

It seems to us that these few measures will bring a new clarity to what is now an impossible situation.

Private Placement Financing in the Rubber Industry

Special Industry Report

EXPANSION in the rubber and rubber products industry during the past decade has proceeded at a phenomenal rate. Much of this is undoubtedly due to new products which have come on the market since the war. But unfortunately, the increase of capital has not kept pace with the industry's growth, and as a result, many rubber and rubber product manufacturers are seeking new sources of long-term funds. Some of these companies go into public financing. But many would like long-term loans, such as are made by institutional investors.

For this reason W. T. Grimm & Co., Chicago, Illinois, Financial Consultants, which specializes in negotiating long-term loans and handling questions concerning long-term financing, has prepared this study for RUBBER AGE to explain general requirements and procedures in the direct placement loan field.

About one-third of all corporate securities sold in 1957 went directly to insurance companies . . . and other institutional investors.

According to Securities and Exchange Commission reports, about one-third of all corporate securities sold in 1957 went directly to insurance companies, fraternal orders, pension funds, and other institutional investors. These security issues never went through underwriters, never passed through SEC registration, did not require an offering prospectus, and cost of flotation was less, on the average, than for a public offering. Such corporate financing is known as direct placement sales or private placement loans. This direct method of raising funds is used by small as well as large companies. How is this private placement financing done, who does it, under what conditions, and what are the drawbacks?

Amounts and Kinds of Loans

Direct placement sales totaled about $5.4 billion (952 issues) in 1956 and $4.5 billion (900 issues) in 1957, according to the January, 1958 Corporate Financing Directory of the *Investment Dealers Digest*. Most of these direct placement sales were arranged through specialists who bring together the institutional investor and the corporate borrower.

About 95 per cent of direct placement issues are debt obligations—bonds, debentures, notes and mortgages. Preferred stock is sometimes used. Most direct placement issues for manufacturing corporations involved debt securities with maturities of 10 to 15 years. However, large well-known corporations frequently are able to negotiate longer maturities. Almost two-thirds of direct placement financing in 1957 was for plant expansion. Working capital needs accounted for almost all the remainder. Refunding of outstanding securities was down sharply from former years and amounted to a very small percentage of the total, according to the SEC.

Direct placement loans may range from as low as $250,000 to over the $100,000,000 mark. To entitle a rubber and rubber products manufacturing company to a loan of $500,000, the borrower should have a net worth of at least $1,000,000 and a good earnings record. Interest rates currently vary from about 5% to 6½% for the average corporation, depending on the credit of the borrower and the supply of lendable funds.

Simplicity, Speed and Savings

Direct placement of corporate securities has grown mainly because of simplicity, speed and savings in cost. Securities and Exchange Commission registration and preparation of an offering prospectus with its attendant legal and auditing expenses are avoided, not because a company may wish to avoid public disclosure, but because the law does not require such registration where no "public offering" is involved. As far as speed is concerned, under favorable circumstances, some commitments for private placements have been negotiated within a week.

Another reason for the popularity of direct placements is the possibility of working out a delayed takedown of the funds, as for example during a construction period. This is particularly advantageous when the construction period for a particular project extends over a long interval, and when interest charges on idle funds would amount to a substantial item of cost.

Costs on direct placements are usually substantially less than on public offerings. This is especially true of smaller loans where issuance and selling expenses expressed as a percentage of proceeds tend to be high. For example, a medium-sized rubber and rubber products company with a net worth of $1¼ million desiring to borrow $500,000 would probably pay around 10 per cent or more of the amount obtained as costs of a public offering. The direct placement commission, however, would probably range from 2½ to 5 per cent. Rubber and rubber product corporations which normally use such direct fianancing are mainly of two sizes: the long established large corporation, and the medium-sized company, usually unknown to investors, coming into the market for outside financing for the first time.

Evaluation of an Application

Institutional investors seek certain basic information in evaluating a rubber and rubber product manufacturer's application for a direct loan. By and large, the investors want: first, to be assured of a competent management in the borrowing company; second, to find a history of company profits and demonstrated ability to repay the loan; and third, to have some assurance that the new funds will be put to constructive use.

The role of the private placement specialist is to counsel with the issuer as to the best type of issue to meet his needs and thereafter to prepare a comprehensive report which will cover company history, purpose and terms of the loan, analysis of financial statements, calculation of investment ratios and legality status, appraisal of management and key personnel, standing in the industry, long-range outlook and related information. Then, the specialist proceeds to present the proposal to the proper institutional investor and to negotiate the best terms obtainable on behalf of the borrower.

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Certain insurance companies have strong preferences for certain types and amounts of loans. Other insurance companies seek other characteristics in size, location and industry. Industrial pension funds, fraternal orders and trusts have similar preferences.

private placement financing—

There are well over 300 institutional investors in this country and Canada, and each has its own investment policy. A good deal of the art of the direct placement specialist lies in knowing exactly which institutional investors are seeking what kind of loans at the moment, and then counseling the corporate borrower on the best source of funds, the best media and the best terms.

A good deal of the art . . . lies in . . . counseling the corporate borrower on the best source of funds, the best media and the best terms.

The latter—the best terms—is of major significance to the borrower. Rubber and rubber product company officers are often wizards at understanding their own financial situation, but usually do not know if the terms offered in an institutional loan are too tight, or if a better deal is available elsewhere. In 1957, for example, some of the direct placement loan terms demanded by the majority of institutional investors were very rigid by comparison with terms of former years when money was available at lower interest rates. The most noticeable change in terms during 1957 occurred in the higher interest rates and non-refundable covenants of the loans. Some loans were made with non-callable features for 10 to 15 years, a condition that some borrowers are sure to regret before the loan matures.

Counseling the Borrower

Not only must the borrower be counseled on the principal amount to be borrowed, but the maturity, interest rate, call prices and offering price require careful consideration. Quite often, borrowing corporations will accept sinking fund provisions on their loans which may prove embarrassing in future years—but so interested are they in the principal sum, that they often overlook repayment clauses.

The same applies to call prices on the issue. Fairly often, a company wants to retire a long-term insurance company loan because other sources of funds at a lower cost have become available. To substitute one for another may become very costly, or even impossible, unless such a contingency is provided for initially so that the borrower is permitted to prepay his loan in the first place, and if so, the penalty for doing so must not be too burdensome.

The same considerations hold with regard to security for the loan. Should it be a closed or an open-end first mortgage on all fixed assets of the borrower, or would a debenture, saving trustee's fees, serve just as well? Should the loan permit or preclude additional funded debt, or bank indebtedness? Should the borrowing corporation accept a provision where it agrees to maintain a certain specified current ratio? What about dividends? Sometimes an institutional investor may insist that the borrowing company limit its dividends to 25 or 50 per cent of net income after taxes and sinking fund payments. Other institutional investors may permit 75 per cent or more.

Other problems may arise concerning the sale of fixed assets during the term of the loan. Some loan agreements permit such sale, others do not without the consent of the lender. Notwithstanding these technicalities, vexations and problems, corporations of all types borrowed $4.5 billion in 1957 through direct placements—evidence that these problems have solutions.

Drawbacks to Private Placements

The thought must occur to the reader that private placements must have disadvantages. The drawbacks to private placements—if they are drawbacks—often appear in loan covenants. Rubber and rubber product company officers might well weigh the effect of them on their own situations. For example, in every direct placement loan agreement there is a summary of terms and conditions to which the borrower agrees to adhere so long as the issue remains outstanding. Whether these covenants are likely to be burdensome or not must be decided by each company for itself. For example, the borrower often agrees, after giving effect to the loan:

(a) to maintain net working capital at all times equal at least to 150 per cent of the initial loan;

(b) to maintain current assets equal at least to 150 per cent or perhaps 200 per cent of current liabilities, depending on the type of business represented;

(c) not to merge or sell substantially all of the assets without the lender's consent;

(d) to restrict dividends to earnings subsequent to the date of the loan; and

(e) not to pledge any accounts receivable or other current assets to secure bank loans.

These are some typical terms for the average medium-sized industrial corporation. They may be burdensome—perhaps more restrictive than the terms of the average public debt issue. While a direct placement loan can normally be designed to meet the specific requirements of each borrower, the basic loan covenants will not be too far removed from those just cited. However, after a loan is made, any specific covenant in a private placement can be modified far more easily than one in a publicly-sold issue.

Funds borrowed and profitably employed provide earnings leverage on outstanding common shares. Debt securities are the cheapest to service since the interest cost of the money is deductible before calculation of Federal income taxes; but every dollar borrowed must be repaid when due. The repayment date might come at an inopportune time. To avoid any such difficulties, almost all direct placement loans are repayable in moderate, equal, annual payments during the life of the loan.

Not all direct placement issues are debt securities. An increasing number of preferred issues have been used in the last few years. Most of these preferreds have sinking funds which will retire the issues in 10, 15 or 20 years. The disadvantage of a preferred is the relatively high carrying cost which requires roughly $12 of pre-tax earnings per share to pay a $6 dividend. The advantage is that larger equity base is obtained upon which more debt issues can be placed.

Outlook for Long-Term Financing

Starting in 1956, it became increasingly difficult for the average manufacturing corporation to borrow long-term funds as the money market became increasingly tighter. While lenders did about the same dollar value of direct placement in 1957 as in 1956, they became more selective and up-graded their loans sharply by selecting better credit risks. At the same time interest rates rose sharply until October-November, 1957, and in some cases the borrower gave other inducements to the lender in order to obtain a loan, such as rights to purchase common stock, convertibility of the debt issue, and so forth. In addition, lenders tightened up the terms of loan agreements. As previously mentioned, for example, they often specified that their loans could not be called or refunded at least for the first few years.

These conditions in the money market in many cases discouraged the average manufacturer from obtaining long-term financing last year. However, there is tangible evidence that the long-term money market is returning to more normal conditions. Indicative signs are that the Government's cost of borrowing is falling, the prices of industrial bonds in the hands of the public are rising, and the Federal Reserve System is pursuing a policy of increasing the money supply and lowering the cost of money.

The principle . . . is this: Long-term loans are based on demonstrated earning power rather than the value of fixed assets.

In summary, it might be said that for rubber and rubber product companies which are aware of the facts and still prefer debt financing—as many of them do for a variety of reasons—private placement financing offers an efficacious, low-cost route to necessary funds. The principle which specialists in this field emphasize, is this: Long-term loans are based on demonstrated earning power rather than the value of fixed assets. If a company has adequate earning power, it is eligible for most forms of direct placement financing. With improving conditions in the money market, it is recommended that all companies reappraise their long-term financing needs with the view to taking advantage of current lower interest rates and relaxation of stringent covenants which prevailed throughout 1957.

Scrap Rubber Group Meets At NAWMD Annual Convention

► The 45th annual convention of the National Association of Waste Material Dealers, Inc., held at the Waldorf-Astoria Hotel in New York City from March 15 to 18, featured a meeting of the Scrap Rubber and Plastics Institute on March 18. Sidney Freedman (Muehlstein), president of the Institute, reported that the outlook for the scrap rubber market in the near future is slightly more optimistic than the present business trend indicates.

Mr. Freedman stated that during the summer months there is an upturn in the purchase of replacement tires and this will be reflected by increased consumption of scrap rubber by the reclaim industry. He also noted that the postponement of the proposed increase in carload freight rates has been helpful to the entire scrap rubber picture.

The principal speaker at the Scrap Rubber and Plastics Institute meeting was R. H. Sharp (U.S. Rubber Reclaiming). Mr. Sharp told the meeting that the problems of the rubber reclaiming industry are common to the buyer as well as the seller. "While we are not always looking at the problem from the same viewpoint, we are knit together and rise or fall with the sales of the reclaiming production units. One might say that 'price' is the point on which we must differ the most. Actually this is not so, for a booming reclaim business needs lots of scrap rubber and a higher cost for this raw material is a small price to pay for the expanded profits which go with this good business."

Cites Price Factors

Mr. Sharp observed that the price of any scrap rubber is largely affected by supply and demand and not by what the reclaimer wants to pay. Scrap rubber brokers are in a key position because they are the middlemen who must act as liaison, passing on information to suppliers as to why they should do a better job of packing and shipping scrap rubber—particularly of the specialties. Scrap rubber brokers must also educate the suppliers to the new economic position of reclaimed rubber in the field of total rubber usage, he stated.

Because times have changed and the reclaimed rubber industry is only secondarily in competition with natural rubber, last year's wage increases could not be passed along to the customers as in the steel and oil industries. "Our competition is now oil enriched GR-S and this has remained stable in price for years." The industry must make every effort to remain competitive, he said. It is also up to the rubber reclaimer to see that this information is passed along to the scrap rubber shipper.

As for general market conditions, Mr. Sharp stated that the tire companies are looking for a good replacement business in 1958 and believes that this will be reflected in a business pickup for the reclaiming industry and scrap rubber business.

Assembled Mill Shipped

► A complete rubber mill, fully assembled, and weighing about 28 tons, has reached the Apex Tire and Rubber Co., Pawtucket, R. I., from its British manufacturers, Reed Brothers (Engineering) Ltd., Woolwich Industrial Estate, London, England. Believed to be the first machine of its type to be imported here as a "packaged mill", the single geared 150 h.p. mill is completely self-contained, entirely independent of any floor foundation and ready to run in one piece. All that had to be done was to roll the mill into position on the factory floor and to connect electric and water services.

Cyanamid Receives USDA License

► American Cyanamid Co., New York, N. Y., has been granted a license by Secretary of Agriculture, Ezra Taft Benson for use of U. S. Patent No. 2,775,578, "Polymerization Initiated by Saturated Cyclic Terpene Peroxides", a United States Department of Agriculture patented process involving turpentine derivatives. The company was previously licensed to employ a companion USDA patent on methods for making the pine-gum chemicals themselves, U. S. Patent No. 2,735,870, "Peroxides of Standard Cyclic Terpenes and Method of Producing Same". The patents cover preparation of saturated terpene hydroperoxides and their use as polymerization catalysts. They were issued to USDA scientists Gordon S. Fisher and Dr. Leo A. Goldblatt of the Southern Utilization Research and Development Division, Agricultural Research Service, New Orleans, La. Like other patents based on discoveries by USDA researchers, they are available for use by industry without cost under licenses granted by the Secretary of Agriculture.

Most Tire Firms Report Higher 1957 Sales-Profits

► Major tire companies fared as well, if not better than many firms in other industries as far as 1957 sales and profits were concerned, according to a recent article in the *Akron Beacon Journal*. (See table on next page.) As an example, nine of the eleven companies in this category that have issued financial reports showed gains in sales. The two companies that did not show sales increases missed by only small margins. Six of the companies showed profit increases even in the face of the slump that developed in the closing months of the year.

For seven of the companies, sales were at an all-time high, with Goodyear topping a billion dollars for the seventh time in succession, and Firestone for the fourth time in the last five years. General Tire, Dayton, Armstrong, Lee Rubber, and Seiberling were the other concerns with banner sales years. Goodrich and Mohawk had sales gains but not new highs.

Mohawk Rubber Co., the smallest of the group, reported the big increase—38 per cent in sales and 52 per cent in profits. The only declines in sales were U. S. Rubber's 3.1 per cent and Mansfield Tire's 2.6 per cent. These companies were the only ones to wind up the year with lower sales as well as lower earnings. With profits off nearly $1 million, Dayton Rubber had the roughest year with income down 37.8 per cent.

Goodrich Earning Record

The *Akron Beacon Journal* reported that both Goodrich and Seiberling earnings were off 10 per cent. Goodrich, however continued with the best earning record in the industry in relation to sales; something it has been able to achieve virtually every year since World War II. The statistics showed that the Goodrich profit per dollar of sales was 5.4 per cent as compared to Firestone's 5.3 per cent and Goodyear's 4.6 per cent. In 1956, Goodrich earned 6 per cent on sales.

Since some of the companies' fiscal years

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ended in the fall, they did not feel the impact of the business recession that set in during the closing months. Armstrong Rubber's year ends September 30; Firestone, Dayton and Lee on October 31, and General Tire on November 30.

That the slump will have a marked effect on 1958 earnings is indicated by Firestone's recent statement for the first three months of its fiscal year. Firestone profits were down 14.7 per cent and sales 6.7 per cent as compared with the same period in 1957.

Rubber companies as a whole didn't do as well as the tire firms last year, according to another survey made by the *Wall Street Journal*. This survey indicated that the rubber industry's profits for the fourth quarter were down 24.8 per cent as compared to the same period in 1956. For the year, the reduction in income was 3.8 per cent.

The brightest spot in the tire industry continues to be replacement passenger tire sales. It is reported that manufacturers' shipments of these in January, were 69 per cent higher than in December, 7 per cent above January, 1957. Admittedly, December business was weak because of the holiday season, and the fact that dealers like to wind up the year with as small an inventory as possible due to tax reasons.

MAJOR TIRE COMPANIES SALES AND PROFITS FOR 1956 AND 1957

	Sales		Profits	
	1957	1956	1957	1956
Goodyear	$1,421,850,335	$1,358,763,538	$64,825,516	$62,456,130
Firestone	1,158,884,304	1,115,179,783	61,692,152	60,538,848
U. S. Rubber	873,583,074	901,260,194	29,695,027	31,870,013
Goodrich	734,650,802	724,168,401	39,369,705	43,765,431
General Tire	421,165,147	390,471,772	11,300,355	10,860,129
Dayton	83,613,850	75,813,409	1,613,634	2,593,003
Armstrong	76,137,429	71,313,421	2,950,423	2,797,963
*Mansfield	59,894,000	61,557,595	1,370,210	1,376,683
Lee Rubber	48,601,093	46,581,943	1,762,581	1,612,800
Seiberling	46,934,437	46,663,811	943,011	1,051,049
Mohawk	20,842,426	15,126,701	563,180	370,525

*1957 figure estimated.

Marks 50 Million Tubeless Tires

► Firestone Tire and Rubber Co., Akron, Ohio, held ceremonies recently to mark the production of the 50,000,000th tubeless tire to be manufactured by the company. James E. Trainer, executive vice-president, said at the ceremonies that tubeless tires have become universally accepted as a vast improvement in tires since they were first supplied to the automotive industry by Firestone for 1954 model cars. Now tubeless tires account for virtually 100 per cent of original equipment passenger tires and for a major portion of replacement tires. He stated "tubeless tires have introduced a new era of safety in automobile transportation", and called the development "the greatest advance in tire engineering since the development of the balloon tires in the early 1920's". Mr. Trainer predicted that more tubeless tires would be sold for the replacement market in 1958 than in any previous year in history.

M-1200 Reswax Concentrate

► The Coatings and Adhesives Department of the Borden Chemical Co., New York, N. Y., has announced the development of a new Reswax concentrate called "M-1200", a concentrated blend of butyl rubber and microcrystalline wax. The product is applicable as an additive to microcrystalline wax in the coating of heat seal labels for the lamination of glassine to boxboard and for the lamination of glassine itself. Developed for use by wax refiners who make refinery cuts of butyl in microcrystalline wax, M-1200 is in production, along with other Reswax concentrates, at company plants in Chicago, Ill., Toronto, Ont., and Peabody, Mass.

European Chemical Congress

► The 12th Chemical Exhibition and Congress will take place within the framework of the European Congress of Chemical Engineering—1958 which will be held in Frankfurt/Main, Germany, on May 31 through June 8, 1958. Some 700,000 square feet of covered floor space as well as 50,600 square feet of outside area will be utilized for an exhibit of apparatus machines, instruments, products and auxiliary items for chemical science and technology. More than 6,000 manufacturers engineers, chemists and physicists are expected to participate representing some 950 European and overseas concerns Visitors are expected from more than 50 countries. A complete program of the events scheduled to take place at the 12th Chemical Exhibition and Congress and the European Congress of Chemical Engineering is available from Dechema, Frankfurt/Main 7, Postfach, Germany.

Introduces New Cellular Line

► Introduction of a new complete line of industrial cellular materials in addition to its line of open cell sponge for the shoe trade has been announced by the American Biltrite Rubber Co., Chelsea, Mass. The new industrial line includes five grades of open cell material named "Sponge-Rite." These materials, available in rolls, meet ASTM specifications R-11, R-12, R-15, SC-11, and SC-12. In addition, the company is marketing three grades of closed cell material named "Amcel." Available in sheets, these materials meet ASTM specifications SC-41, SC-42 and SC-43. Sponge-Rite and Amcel cellular materials have been developed by American Biltrite's research department to meet rigid requirements for use as gasketing, packing and cushioning. Charles F. Smith has been appointed manager of the Sponge Rubber Division and Charles S. Marlor, formerly of the U. S. Rubber Co., has been appointed sales representative for the Division in the New England and Middle Atlantic states.

Pigment Club Elects Officers

► The fifth annual meeting of the New York Pigment Club, held recently in New York City, featured an address by Herbert Watjen (Vansul) on "Pigmentation of Plastics and Rubber", and the election of officers for 1958. Those elected were: *President*, J. Arnold (Paul Uhlich Color); *Vice-President*, H. H. Johnson (H. Kohnstamm); *Secretary*, R. U. Copland (L & R Organic Products), and *Treasurer*, R. Broulliard (General Aniline). The board of governors includes H. Holtzman (Ansbacher-Siegle), D. Hambrecht (Ciba), J. Loughlin (National Aniline), P. Ricciari (DuPont), J. Samko (Collway Color), and N. Segal (Landers-Segal). The next meeting of the group was to have been held on April 10 at the Frances Tavern in New York City. Fred C. Petke, vice-president in charge of research for the Anders Chemical Co., was to have spoken on "Pigments in Printing Inks". The fourth annual dinner dance has been scheduled for May 10 at the Tavern On The Green in Central Park, New York City.

Naugatuck To Market Tropiglas

► Naugatuck Chemical Division of the U. S. Rubber Co., Naugatuck, Conn., has concluded a marketing agreement with Russell Reinforced Plastics Corp. under which Naugatuck will distribute nationally reinforced plastic panels for decorative and architectural use. Russell Reinforced, which operates manufacturing plants in Lindenhurst, N. Y., and Boca Raton, Fla., has developed colorful translucent and weather-resistant plastic panels called "Tropiglas". The panels, said to be both decorative and useful, are made in 22 colors and in three basic types of construction. Lightweight and rugged, they will not shatter, rust or fade, and have withstood hurricane-force winds, the company states. A nation-wide distribution system for the panels is now being organized by Naugatuck. The outlets will be principally architectural supply firms.

Annual New York Toy Fair Attracts Record Attendance

► Some 16,000 toy buyers and visitors attended the 55th Annual American Toy Fair sponsored by the Toy Manufacturers of the U.S.A., Inc. in New York City from March 10 to 19. Over 1,600 manufacturers and distributors exhibited their products at the Sheraton-McAlpin and New Yorker Hotels and at private showrooms throughout New York City. An increasing number of products made of or with vinyls, urethanes and latices were in evidence and many molded rubber toys were also shown.

Toy manufacturers report that for many years the market has been subject to an unhealthy seasonal spurt centering about the Christmas season. The current trend, however, is to distribute the toy buying season through the spring and summer months. The introduction of many types of outdoor pools and swimming equipment has facilitated this trend.

Many of the rubber manufacturers exhibiting at the Toy Fair, for example, showed lines of diving equipment, swim fins and back yard bathing pools. Sun Rubber Co. of Barberton emphasized its "Tournament" basketballs and "Varsity" footballs in addition to its patented line of "Sunny Tears" dolls. The Globe Rubber Products Corp. of Philadelphia, Penna., displayed an extensive line of rubber swim accessories and diving equipment.

Other Novelties Noted

Molded rubber bathtub boats and miniature shovels and pails were featured by the Apex Tire & Rubber Co. of Pawtucket, R. I. Topstone Rubber Toys Co. of Bethel, Conn., introduced a new line of molded rubber animals realistically scaled one inch to the foot. Topstone also showed its wide line of horror and comic rubber masks featuring Walt Disney and other cartoon characters. A balloon gun that inflates rubber balloons and then shoots the balloon 10 or 12 feet was highlighted by the Van Dam Rubber Co., Inc., New York, N. Y.

The Rubbermatic Gun Corp. of Clarksville, Texas, displayed an automatic Western pistol that shoots six rubber bands as fast as you can pull the trigger. The quantity and diversification of rubber balls and balloons displayed by the Barr Rubber Products Co. of Sandusky, Ohio, ran the gamut from air playballs decorated with decals of bunnies playing banjos to official size and weight basketballs and footballs.

In total, a vast profusion of dipped rubber balloons, molded rubber balls, latex stuffed dolls and animals and an infinite variety of interesting toys made either with or from rubber and plastics were displayed at the show.

► Manufacturing Chemists' Association, Inc., 1625 Eye St. N. W., Washington, D. C., has announced publication of a revised safety data sheet on acetylene (SD-7). It is priced at 30c.

Crockett

Crockett Succeeds Burt at Goodrich-Gulf Chemicals

Burt

► Goodrich-Gulf Chemicals, Inc., Pittsburgh, Penna., has announced the election of L. O. Crockett as president and chief executive officer, succeeding W. I. Burt, who has been elected chairman of the board. Mr. Crockett, vice-president of petrochemicals for the Gulf Oil Corp. since 1955, is a veteran of nearly 36 years with that firm. He started as a laboratory assistant at the Port Arthur, Texas, refinery and six years later, was promoted to foreman of one of the major lubricating oil processing units. In 1934, he was named chief chemist for the three refineries Gulf then operated in Texas. Mr. Crockett was promoted to assistant general superintendent of the company's refineries in Texas in 1945, continuing in this capacity until 1950, when he was named manager of the Technical Division of the Manufacturing Department. In 1954, Mr. Crockett was named manager of a special administrative unit designated Petrochemical Activities and a year later, he became general manager of the newly established Chemicals Department. He was named a director of Goodrich-Gulf Chemicals, Inc., in 1952.

Mr. Burt joined the B. F. Goodrich Co. in 1927 as a research chemist. Advancing through several grades and capacities with Goodrich, he was elected vice-president, manufacturing for the Goodrich Chemical Co. in 1944, remaining in that position until 1955, when he was elected president of Goodrich-Gulf. Mr. Burt has served as a director of the American Institute of Chemical Engineers and served that body as its vice-president in 1951 and president in 1952.

Cadillac Plastic Expands

► An expansion program for 1958 which is expected to cost $825,000 has been announced by Cadillac Plastic & Chemical Co., Detroit, Mich., autonomous subsidiary of the Dayton Rubber Co. The firm will use $575,000 of this amount for new equipment and a large addition to the company's extrusion and casting plant in Warren. An additional $250,000 will be invested in stocks of new plastic lines in the company's ten regional warehouses. The firm will also create a product sales division and will undertake a new distribution plan for DuPont "Mylar" film and polyethylene lay-flat tubing. Kenneth A. Glabach, formerly of the St. Regis Paper Co., has been named head of the new division, which will handle sales and applications of the 12 types of plastic distributed by Cadillac.

Named Senior Technician

► The appointment of Lewis H. Conklin as a senior technical man has been announced by the B. F. Goodrich Chemical Co. Development Center at Avon Lake, Ohio. Mr. Conklin, a chemical engineering graduate of Pennsylvania State University, joined B. F. Goodrich in 1951 as a development engineer. He worked for two years in synthetic rubber development and became a technical man in rubber chemicals development in 1953. Mr. Conklin is a member of the American Institute of Chemical Engineers, the American Chemical Society and its Rubber Division, and the Akron Rubber Group.

Join Midwest Rubber Reclaiming

► Midwest Rubber Reclaiming Co., East St. Louis, Ill., has announced the appointment of Dr. Frederick Lewis Kilbourne, Jr., as consultant on technical matters and George N. McNamara as sales representative. Dr. Kilbourne was formerly associated with the Connecticut Hard Rubber Co., where he was manager of research and development. Prior to that, he was a research chemist and later chief chemist with the Xylos Rubber Co. He was graduated from Brown University with a B.S. degree in chemistry in 1926, received his M.S. degree at the University of Akron in 1927 and his Ph.D. in 1934 at Massachusetts Institute of Technology. Dr. Kilbourne is a member of the Rubber Division of the American Chemical Society. Mr. McNamara was formerly a sales representative for the Pequanoc Rubber Co. He attended Montclair State Teachers College where he majored in chemistry and he was graduated in 1937. Mr. McNamara is a member of the American Chemical Society and the Akron, Philadelphia and New York Rubber Groups.

Joins Stowe-Woodward

► Kenneth S. Goodyear has joined Stowe-Woodward, Inc., Newton Upper Falls, Mass., as plant manager. Mr. Goodyear is a graduate of Middlebury College with a B.S. degree in mathematics. He also has an extensive background in rubber and had been associated with the U. S. Rubber Co. for 18 years. Serving the firm in several capacities, he built and operated the first foreign division for U. S. Rubber in Cuba.

A laboratory technician inspecting a sheet of Viton synthetic rubber.

DuPont Opens Viton Plant

► At a special press conference held on March 14 at the Chemists' Club in New York City, E. I. du Pont de Nemours & Co., Inc., disclosed that a plant is nearing completion at Deepwater Point, N. J., to produce the new fluorine-containing elastomer called "Viton" synthetic rubber. Company spokesmen said no commercial elastomer equals Viton in resistance to oils, fuels, and solvents at temperatures above 400°F. DuPont describes this development as a major break-through in elastomer chemistry. (Editor's Note: A technical article on Viton A appeared in the October, 1957, issue of RUBBER AGE).

Viton is a linear copolymer of vinylidene fluoride and hexafluoropropylene and contains about 65 per cent fluorine by weight. The new synthetic rubber has been produced in a pilot plant since 1956 for development and evaluation by rubber companies. Because of the acceptance accorded Viton by industrial design engineers who needed an oil-resistant rubber in high temperatures, the company decided to build a full-scale commercial plant immediately. The facility was to have gone into production in April.

Fluorine Chemistry Activity

Viton is a result of DuPont's long activity in the field of fluorine chemistry. The introduction of "Freon" fluorinated hydrocarbon refrigerants in 1931 was a milestone in the development of safe, efficient refrigeration at an economical cost. Later, "Teflon" fluorocarbon resins became known as the first heat and chemical-resistant organic polymers. In working with Teflon, a plastic, engineers were quick to point out that if a rubber could be developed, it would open an entirely new field to the designer.

The incentive to develop an elastomer having such outstanding resistance was strengthened with the development of practical jet power. The advent of high-speed aircraft and missiles meant heat due to speed. It also meant higher temperatures of oils, fluids, and fuels. The aircraft designer needed a rubber having resistance to these liquids at temperatures above 400°F.

Shortly after Teflon fluorocarbon resins were introduced, DuPont chemists found that polymers of certain fluorinated olefins were flexible. Later, chemists at the company's Jackson Laboratory found that copolymers of hexafluoropropylene and vinylidene fluoride not only were much more rubbery but also were resistant to heat, oils, and solvents. After extensive development work and laboratory testing, small scale field trials of Viton synthetic rubber were started in the summer of 1956.

Air Force Cooperates

Wright Air Development Center worked with DuPont in varied and rigorous tests during 1956 and the polymer functioned well and, in some cases, even exceeded laboratory expectations. Early in 1957, it was decided to construct the commercial plant in New Jersey. As might be expected, much of today's demand for Viton is for use in military aircraft and missiles. However, important non-military uses have been proven and it is expected that commercial applications will out-strip military uses in the near future.

A number of applications have proven the ability of Viton even though the new elastomer has been available in only limited quantities. The largest single use to date has been aircraft seals. There is a growing interest in other kinds of products, such as hose, protective clothing, fuel cells, wire insulations, caulking, and paint. Because temperatures are increasing in commercial engines, Viton is under active consideration for transmissions, brakes, instruments, and pumps.

An outstanding example of a commercial application of Viton is its use as valve stem seals on Ford's new super duty truck engines. These engines employ sodium-cooled exhaust valves which cause extremely high temperatures at the valve stem seal. Other commercial applications of Viton include brake cups, pump seals in automatic transmissions, gasoline pumps, thermostat bellows, fire walls, fuel tanks for aircraft, aircraft tires, portable storage tanks, and coverings for industrial rolls.

► "Effect of Chemical Media on Hypalon" and "Improved Metal Oxide Curing Systems for Hypalon 20" are the titles of two bulletins recently issued by the Elastomer Chemicals Department of the E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

Goodyear Report Predicts Major Consumption Increase

► United States consumption of new rubber, both natural and synthetic, is expected to reach 1,635,000 long tons by 1960, an increase of 151 per cent in the 20 years since synthetic has come into general use, according to the annual report of the Goodyear Tire & Rubber Co., Akron, Ohio. This estimate compares with United States requirements of 652,000 tons in 1940, when 99 per cent of the total was natural rubber, and with the 1957 consumption figures of 1,469,000 tons, 60 per cent of which was synthetic rubber.

Reviewing company advances, Goodyear states, "The rubber industry in general and Goodyear in particular are taking steps to assure an adequate supply of rubber to meet this increasing demand." Goodyear cited its synthetic plants at Houston, Texas and Akron, Ohio which were expanded by 50 per cent during 1957 and which now provide a total production capacity of 247,500 tons annually. The company says that the Houston plant has become the largest facility of its kind in the world. The unit employs 700 and has a production capacity of 220,000 tons of rubber annually. Production of an equivalent amount of natural rubber would require a plantation of 328,000 acres planted with 36 million rubber trees, utilizing the services of 65,000 workers and requiring a capital investment of $164 million.

Adds 500,000 Ton Capacity

The synthetic rubber industry, under private management has added 500,000 tons of additional capacity in less than 30 months, the report states. However, increasing world wide demand for rubber and rubber products indicates that early in the next decade, there will be a shortage of natural rubber. With the production of "Natsyn" rubber, a synthetic polymer said to be essentially identical to tree rubber, Goodyear hopes to meet increasing demand.

There are also replanting and new planting programs underway at the company's plantations in Sumatra, the Philippines, Central and South America. It was disclosed that last year the company spent $82,947,363 on plant expansion and improvements. In addition to a $10 million enlargement of the Houston synthetic plant, major projects included construction of a fully automtaic tire curing plant at Los Angeles, Calif.; a new tread rubber plant in Chehalis, Wash., and completion of new tire plants in Colombia, Venezuela, the Philippines and Scotland.

Elected Spalding President

► A. G. Spalding & Bros., Inc., Chicopee, Mass., has announced that Edwin L. Parker, executive vice-president, has been elected president of the firm succeeding Walter B. Gerould. Mr. Gerould remains a director and will serve as chairman of the Finance Committee. Mr. Parker also was elected a director of the company.

Indian Rubber Group Holds Annual Meeting in Calcutta

► The Association of Rubber Manufacturers in India held its Annual General Meeting on December 12, 1957, at Dunlop House, Calcutta, India, to review progress made during the year and to discuss future plans. The meeting also featured a talk by J. Luckham, managing director of Dunlop Rubber Co. (India) Ltd. and chairman of the Association, and an election of officers for 1958.

In a report of progress made by the Indian rubber industry last year, ARMI states that consumption of rubber was higher than ever, reflecting the rubber manufacturing industry's growing role in the country's increased industrialization. Output of rubber in South India, however, did not keep pace, and from January to September, 7,926 tons of natural rubber and 2,299 tons of synthetic rubber were imported to meet manufacturers' needs. South Indian production of raw rubber is expected to lag behind for several years as the scheme of replanting 7,000 acres a year during the next ten years, started in 1957, will not yield appreciable results for at least 10 years. It was noted that consumption of synthetic rubber rose steadily to 2,887 tons in 1957.

Despite a scarcity of rubber, Indian rubber prices remained stable at the government controlled rate fixed in September, 1955. There was also in effect a price equalization policy for imported rubber. Under this policy, imported rubber offered no incentive for manufacturers from the price angle and purchase of imports was resorted to only in cases of actual necessity. The association felt that the import of over 7,900 tons of rubber in spite of this price structure, served as an index to the rate at which South Indian plantations must catch up with industry in order to make the country self-sufficient.

Chemical Plants Planned

According to ARMI, attempts have been made to set up in India, manufacturing plants for accelerators and antioxidants carbon black, dyes and synthetic rubber all essential to the industry. The group reported that though negotiations to this end appear to have progressed, no final conclusions have been reached.

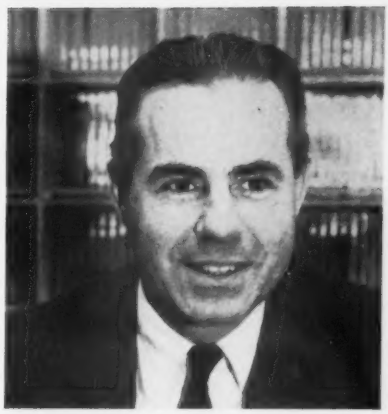
During the year, progress also has been made in establishing a Manufacturers' Research Association, which is now in the process of being registered with the Registrar of Joint Stock Companies at Delhi. The research laboratory is expected to be organized as a cooperative organization with results available to all members.

A review of Tariff Commission Enquiries during the year included enquiries on the titanium dioxide industry and on continuance of protection to the stearic acid industry. The government accepted the commission's recommendation to allow protection to titanium dioxide up to the end of 1961 and to assist the industry's plans for expansion. It has also been recommended to extend the period of protection to the stearic acid industry up to 1959.

Activities which ARMI has undertaken were reported to members. The association participated in the Rubber and Plastics Exhibition organized by the National Chemical Laboratory, Poona, from February 25 to March 10. Technical talks to members in Calcutta were arranged and given by Harry J. Collyer of the Cabot Carbon Co. of U. S. A.; T. E. Salisbury of the Synthetic Rubber Department of Firestone International of U. S. A., and Dr. Siegmund Reissinger of Bayer, Leverkussen, West Germany.

In his talk to Association members, J Luckham summarized present conditions in the Indian rubber industry and discussed progress in rubber technology abroad. He urged that the industry concentrate on increased exports and discussed industrial expansion plans which are geared to meet this goal.

During the meeting, Mr. Luckham was re-elected chairman of the Association for the ensuing year and the following committee was elected: Dr. D. Banerjee (National Rubber Manufacturers), D. Bose (Bengal Waterproof Works), H. Hall (Indian Rubber Manufacturers), J. Vyoral (Bata Shoe), A. D. Wenzel (Firestone Tyre), and B. J. Woodley (Indian Cable).



John W. Groesbeck

Groesbeck Joins Callaway

► Callaway Mills, Inc., New York, N. Y., has announced the appointment of John W. Groesbeck as sales representative of industrial fabrics and yarns to the mechanical rubber goods industry. Mr. Groesbeck, who will have his headquarters in the New York office, was previously in the Sales Department of the Lumite Division of Chicopee Manufacturing Corp. Prior to that he was associated with the Tire Cord Sales Department of Deering Milliken. He is an alumnus of Rider College and is a U.S. Air Force veteran.

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Rubber Chemical Sales Group Announced in Akron Area

► Details as to the formation and early meetings of the Rubber Chemical Salesmen's Association of Akron, an organization established by and for those engaged in the sale of rubber compounding ingredients, have now been made available. The founding meeting of the organization was held on May 24, 1957 at the University Club of Akron, Ohio. At this meeting a motion was passed to draw up a constitution and by-laws. The second meeting of the group was held on July 12 at which time the constitution and by-laws were reviewed. On December 26, 1957, the third meeting of the new organization was held. The question of incorporating the group came up at this meeting. It was decided that those who were present at any of the three organizational meetings be considered charter members of the organization.

A special meeting was held on January 2 at the University Club with George Brittain, secretary of the Akron Chamber of Commerce as a guest. Mr. Brittain advised the new group to incorporate and suggested that a board of directors be elected, and from this group officers be named. Accordingly, the following officers were elected: *President*, Ernest L. Puskas (Thiokol Chemical); *Vice-President*, Frank E. Bell (Goodrich Chemical); *Treasurer*, Dewey R. Butt (Standard Oil); *Secretary*, John W. Shrontz (Hardwick Standard).

The following members were reelected chairmen of the committees noted: *Membership*, Warwick McCutcheon (J. M. Huber); *Program*, Laurence F. Pieroth (Naugatuck Chemical); *Social*, Carter M. Wilson (Phillips Chemical); *Publicity*, Gilbert D. Gingold (Sid Richardson Carbon).

Speaks on Practical Selling

On January 31, the association was addressed by C. A. Rische, supervisor of sales training for the Goodyear Tire & Rubber Co., who spoke on "Practical Selling." At the meeting on February 28, a motion was made that the constitution be accepted. The speaker at this meeting was S. J. Liedholm of the Internal Revenue Service, who spoke on "Income Tax and Expense Accounts."

The meeting on March 28th was to have been devoted to a round table discussion. On April 25th, the new organization expects to be addressed by a purchasing agent who will discuss problems pertinent to his field of activity. Members of the association have decided to hold two golf outings during the year as well as one family picnic and a dance.

Membership in the group, which has as its aim the promotion of salesmanship and the over-all development and improvement of those engaged in rubber chemical sales, is open to anyone engaged in the field.

► A comparison chart enabling potential purchasers of electric fork trucks to evaluate various types and models, is available from Lewis-Shephard Products, Inc., Watertown 72, Mass.

MAN IN THE NEWS

GEORGE E. CARLSON

► One of the most difficult tasks imaginable is to encapsulate a career as colorful, varied and interesting as that of George Carlson, chairman of the Board of the Minnesota Rubber Co. George has been involved in two world wars, has engaged in a variety of industrial enterprises and his hobbies range from raising exotic tropical fish to developing original recipes for unusual foods. One recipe which George has developed and which he feels is very significant in his success is the "Happiness Recipe". This recipe has lots of vitamins, vigor and vitality — with no calories: "(1) Plenty of patience; (2) Abundance of cheer; (3) Wealth of kindness, and (4) World of friendship. Mix the above ingredients thoroughly, sprinkle freely with a full heart of Love and Generosity, stir in a heap of Loyalty and Congeniality. Bake slowly over a period of time until the above become *one*. Top with cream of Spirituality and Faith."

George started his business career in the electrical contracting industry at the age of 17. His first job was with the Cosmopolitan Electrical Co. which later became Commonwealth Edison, as a power wiring estimator and engineer. He later went into the electrical contracting field on his own and handled the wiring for many Chicago buildings such as Union Station, Marshall Fields, Furniture Mart, Municipal Pier, the Balaban and Katz Theaters and many others. He stayed with electrical contracting for about 25 years with an interruption during World War I, when he served two years in the army. He saw combat overseas with the Coast Artillery.

George thinks that he has one of the longest college careers on record, having attended night school for over 17 years. He studied electrical engineering at Armour Institute in Chicago, chemistry and commercial law at Northwestern University and accounting at the Bryant and Stratton Business Colleges.

In 1931, George helped finance and organize the F. D. Farnam Co. in Chicago. This was really his entry into the rubber business because, while this company manufactured fiber sheeting and gaskets, it absorbed a small rubber plant in Cedar Rapids, Iowa. Its products were O-rings and hydraulic seals, and during World War II it manufactured ammunition box gaskets and seals for torpedoes. During World War II George served as a $1.00 per year man on a Navy Advisory Committee for torpedo seals, and as a member of the Communications Commission.

In 1946, with Paul Dennison, George bought out the Wilson Rubber and Packing Co. of Minneapolis. They changed the name to Minnesota Rubber and Gasket Co. and moved to the suburb of St. Louis Park which is the present location of the Minnesota Rubber Co. Starting with a few thousand square feet of manufacturing space and 12 employees in 1946, the company has grown considerably, now occupying over 145,000 square feet and employing 485 people.

In the early 1950's, George was busy expanding into new fields. In 1951 he organized the Minnesota Silicone Rubber Co. to produce rubber parts of the relatively new silicone materials, and in 1952 Master Tool, Inc. was formed to provide him with tools and dies for his plants.

George was instrumental in the acceptance of a revolutionary step in labor relations. In November of 1954 all time clocks in the plant were abolished and the employees were put on an honor system. George claims outstanding success for this change.

In 1955, upon the death of Mr. Dennison, Mr. Carlson was named president of the company. In 1956 and 1957, growth continued with the organization of Minnesota Rainbow Rubber Co., A-P-D Co., Minnesota Latex Co., and the addition of 32,000 square feet of manufacturing and office space. In the latter part of 1957, the group of subsidiaries were consolidated to form one company and the name was changed to the Minnesota Rubber Co. George continues to head the new organization as chairman of the board.

George has one son, Robert, who serves as his right hand man in the president's office, and is the proud grandfather of two grandsons and one granddaughter. George has a wide variety of interests, but he probably spends most of his time on hunting and fishing, raising tropical fish, trap shooting, travel, gardening and horticulture and cooking.

In his gardening hobby, he landscaped his yard which consists of one acre of land. He specializes in roses, having two of his formal beds planted in many different varieties with the other two beds devoted to annuals. He is also very interested in fruit trees and strange vegetables. He is growing one tree that bears six varieties of apples, and another that will bear apples, pears and plums.

George lays big claims to being a gourmet, and he bases them on the fact that he has developed about 120 recipes. He is especially proud of an Italian barbecue sauce. Incidentally, he says if anyone is interested in some really good eating, to write him for his collection of recipes.

George Carlson's career has lasted over half a century, and every phase of it has been one of growth and progress. His basic philosophy, which is so aptly stated in his Happiness recipe, has made possible his significant contributions in war, in human relations, in the field of rubbber and to the economy of our country. He can look back on his many years of service with a great deal of pride and joy.

This sketch prepared by
Craig Kirkpatrick

Appointed Technical Director

► Consumer Product Research and Development Division of the International Latex Corporation, Dover, Del., has announced the promotion of Paul E. Ambrose to the position of technical director, latex products. Mr. Ambrose, formerly with the Koroseal Division of B. F. Goodrich, joined the Research and Development Division of International Latex in 1946.

Hoch Named Endura Officer

► The Board of Directors of the Endura Corp., Quakertown, Penna., has announced the appointment of Richard C. Hoch as vice-president. Mr. Hoch received his B.S. at Lehigh University in 1950 and since June of that year has been active in research and development for the Endura Corp. He is a member of the American Chemical Society and Technical Association of the Pulp and Paper Industry.

Builds New Factory Warehouse

► Paranite Wire and Cable Division of Essex Wire Corp., Fort Wayne, Ind., has broken ground for a new factory warehouse to be located adjacent to the Marion, Ind., manufacturing plant. Part of a $1 million Paranite expansion program, the new warehouse has over 100,000 square feet of floor area and will provide facilities for storage and immediate shipment of the division's products.

Gordon Research Conferences Schedule 1958 Summer Program

► The Gordon Research Conferences have announced that their 1958 summer programs will include studies of "Elastomers", scheduled for August 4 to 8 at Colby Junior College, New London, N. H., and sessions on "The Chemistry of Adhesion", to take place from August 25 to 29, at New Hampton School, New Hampton, N. H. Edwin B. Newton will be chairman and Paul G. Carpenter, vice-chairman for the conference on "Elastomers". The following program has been announced.

August 4: "Status of the High Temperature Polymer Program", by W. Postelnek; "Mechanico-Chemical Reactions of Polymers", by W. F. Watson; "Effects of Microstructure on Crystallization Rates of Elastomers" by G. S. Trick.

August 5: "Kinematics of a Rolling Tire and Its Application to Tire Performance", by M. Berger; "The Union of Butyl Rubber with Carbon Black", by D. C. Edwards and E. B. Storey; "Attrition of Carbon Black: Effect on the Carbon Black and on its Reinforcing Properties in Rubber", by A. M. Gessler.

August 6: "New Vulcanization Studies with Butyl Rubber", by R. L. Zapp; "Perdeuterio SN Rubber", by David Craig, D. E. Diller, R. B. Fowler, F. A. Regenass, E. H. Rowe, W. L. Semon, J. J. Shipman and H. Tucker. Another lecture on a subject to be announced later, will be delivered by G. N. Welding.

August 7: "Some Aspects of Homogeneous Anionic Polymerization", by Maurice Morton and Alan Rembaum; "The Sorption of Benzene by Natural and Synthetic Polymeric Hydrocarbons", by Paul Fugassi; "The Rheology of Visco-Elastic Materials, by Melvin Mooney.

August 8: "Methods of Studying Rubber-Polystyrene Compositions", by Henno Keskkula, J. A. Schmidt and J. G. Cobler.

Chemistry of Adhesion

In the conferences for "Chemistry of Adhesion", G. W. Koehn will act as chairman, while Alan A. Marra, will serve as vice-chairman. The sessions will be conducted from August 25 to 29 and the following papers will be delivered: "Adhesive Properties of Carboxylic Rubbers", by H. P. Brown and J. F. Anderson; "Adhesion of Fibers to Elastomers", by K. R. Williams and H. T. Patterson; "Hydrophyl Balance Measurements", by J. S. Long; "Adhesion of Porcelain Enamels to Metal High Temperature Adhesives", by B. W. King; "Organic Adhesives" by F. H. Bair; "Ceramic Adhesives", by D. G. Bennett; "Triazine Compounds", by H. H. Levine; "Tack", by C. A. Dahlquist; "Role of Cohesive Failure in Adhesive Bonds", by Turner Alfrey; "Advances in Graft Polymerization", by C. E. Schildknecht; "Graft Polymerization by Irradiation", by D. S. Ballantine and D. J. Metz; "Preparation and Properties of Monolayers on Active Metal Surfaces", by H. A. Smith.

The conferences, established to stimulate research in universities, research foundations and industrial laboratories, consist of informal meetings at which lectures are given and free discussions held. The programs do not review the known fields of chemistry, but bring experts up to date on latest developments, analyze the significance of these developments and provoke suggestions on theories and profitable methods of approach for making new progress. Information presented is not to be used without specific authorization of individuals making contributions. No publications are prepared as emanating from the conference.

Requests for attendance at the conference or for additional information should be addressed to W. George Parks, Director, Department of Chemistry, University of Rhode Island, Kingston, R. I. Each applicant must state the institution or company with which he is connected and the type of work in which he is most interested. Attendance at each conference is limited to 100. From June 9 to August 29, 1958, mail should be addressed to Colby Junior College, New London, N. H.

April is USO Month

Chemical Producers to Merge

► A proposal to merge the Thiokol Chemical Corp., Trenton, N. J., and Reaction Motors, Inc., Denville, N. J., has been announced by directors of the two concerns. Reaction Motors is a pioneer in liquid propellants, while Thiokol has, for some time, specialized in solid-propellant fuel engines. The merger will make Thiokol one of the strongest companies in the field of propellants from the standpoint of research and development. The announcement said the two companies were engaged in missile engine manufacturing activities for all branches of the armed services, in research and development for all types of guided missiles, rockets, satellites and space travel in both the liquid and solid propellant fields.

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SAE Meeting Hears Talk On Ameripol SN Rubber

► Test data on "Ameripol SN", said to be the first synthetic rubber with the same molecular structure as tree rubber, indicates that the new material equals or surpasses natural rubber for use in tires of all types, according to Dr. Waldo L. Semon, director of polymer research for the B. F. Goodrich Co. Speaking before the Society of Automotive Engineers in Detroit, Mich., Dr. Semon stated that the new material answers the nation's urgent need for a replacement for natural rubber.

In the past, heavy duty truck tires required natural rubber for most satisfactory performance. The speaker stated that the new synthetic has been shown to be interchangeable with natural rubber for the production of high-speed truck, bus, airplane, military as well as the road tires.

Four types of the new synthetics were produced in tonnage quantities at the Goodrich pilot plant in Avon Lake, Ohio, for large scale tests. The material was then extensively tested as a complete replacement for natural rubber in the tread and carcass stocks of heavy duty truck and bus tires. On indoor wheel tests of 16 heavy duty express tires (11.00 .by 20), the heat build-up in Ameripol SN tires was less than that in tree rubber control tires, Dr. Semon declared. Milages run by these tires were comparable to those run by tree rubber tires. Resistance to cut growth was better in the Ameripol SN tires. Ten of these tires, placed in intercity high speed bus service were sound after an accumulation of 600,000 miles of travel to the time of regrooving the treads. Tests made on Ameripol SN truck and bus tires showed a total of more than 2 million miles run on 29 mileage account tires, none of which failed in service, Dr. Semon said.

Describes Ordnance Tests

The speaker described Army Ordnance tests of military tires at Camp Bullis, Texas, which indicated that Ameripol SN tires met or surpassed all military requirements and were superior to standard military truck tires in tread wear, tire life, tread cutting resistance and tread splice. SAE members were told that Ameripol SN is identical to the hydrocarbon of natural rubber. "This has been shown chemically by ultimate analysis, unsaturation and derivatives.

"Physically, the identity has been established by infrared spectra, phase microscopy, x-ray diffraction patterns, melting point and second order transition. Most important, commercially, is the fact that Ameripol SN processes the same, vulcanizes the same, is reinforced by carbon black in the same manner and gives cured properties almost identical to those obtained with tree rubber", Dr. Semon said. Goodrich scientists believe that Ameripol SN can be marketed at a price competitive with prices for crude rubber during 1955.

Connecticut Hears Allen On Technical Microscopy

► The February 21 meeting of the Connecticut Rubber Group, held at Manero's Restaurant in Orange, Conn., featured an address by Dr. Raymond P. Allen, consultant in industrial microscopy. In his talk on "Technical Microscopy in the Rubber Industry," Dr. Allen noted that the use of a microscope should do more than just examine the size and shape of pigment particles or study the dispersion of carbon black. Many applications of microscopic methods will provide the clues which lead directly to the answer of a problem.

Dr. Allen told of a case where a rubber hose developed delaminations from an unknown cause. An educated guess suggested the problem to lie in butyl contamination or in contamination from some foreign material. Microscopic examination showed not only that the delamination was caused by a mixture of stocks; it was even possible to identify the foreign rubber stock. This type of exact information makes it less possible for the same trouble to occur again.

Use in Tire Cord Study

In further examples, Dr. Allen pointed out that the microscope was indispensable in the study and control of the optimum impregnation of tire cord. He said that the total amount of dip impregnating a cord, the degree of impregnation, and the distribution of the dip can be determined only with the microscope. Dr. Allen emphasized the value of microscopic method for direct and accurate information as applied to many facets of theoretical and practical laboratory processes.

Produces Foreign Car Tires

► B. F. Goodrich Tire Co., Akron, Ohio, has announced that tires and tubes to fit popular small foreign cars sold in the United States are now available through Goodrich dealers and stores. Company officials said three of the 13 sizes being sold are manufactured in B. F. Goodrich plants in the U. S. A. The remaining ten are manufactured by Goodrich associate plants in France, Germany, the Netherlands and Sweden, which also produce original equipment tires for cars made in their countries and imported to the U. S. Company executives said tires from the Vredestein Co. in the Netherlands and the Trellborgs Co. in Sweden will be branded B. F. Goodrich and those from the Veith Co. in Germany will be labeled Veith-B. F. Goodrich or just Veith. French imports from the Kleber-Colombes Co. in France will be branded Kleber-Colombes.

Rib Hi-Miler Nylon Tire

► Goodyear Tire & Rubber Co., Akron, Ohio, has introduced a new all-nylon cord truck tire in the competitive price range called the "Rib Hi-Miler Nylon". Priced 10 per cent over the Rib Hi-Miler rayon tire, the new tire is made of triple-tempered 3-T nylon cord and features the wide, flat, five-ribbed tread design of its popular rayon counterpart. A company spokesman said "This tire is a natural for the economy-minded small truck owner. Use of nylon cord gives him a strong, durable, long-wearing tire for heavy service usage, at a price little more than that of a regular nylon auto tire." The new tire is available in the tube-type construction in sizes 6.00-16 through 10.00 x 22. Tubeless types are available in 6.50-16 and 6.70-15 sizes.

Dr. R. P. Allen (center) surrounded by officers of the Connecticut Rubber Group. Reading left to right: W. H. Couch, R. T. Zimmerman, Dr. Allen, V. P. Chadwick, and J. W. Perkins.

Ontario Section Hears Newby Discuss Rubber Antioxidants

► Approximately 125 members and guests attended the March 11 dinner-meeting of the Ontario Rubber Group held jointly with the Wellington Waterloo section of the Chemical Institute of Canada at the Royal Hotel, Guelph, Ont., Canada. The technical session of the meeting featured an address by Dr. T. H. Newby, manager of Rubber Chemical Development of Naugatuck Chemicals, on "The Composition and Activity of Rubber Antioxidants."

Dr. Newby discussed the causes of deterioration of rubber, and the chemistry and function of all commercially important antioxidants. The factors leading to deterioration of rubber were cited as oxygen, presence of pro-oxidants, heat, ozone, fatigue, sunlight and weathering, and atomic radiation. Dr. Newby presented a review of the free radical mechanism of oxidation of rubber, and showed that very small amounts of antioxidant are sufficient to break the chain reactions.

Discusses Flex Cracking

In a discussion of flex cracking, it was pointed out that the flex life of natural rubber is greatly reduced if it flexes over a wide range, and if the strain passes through zero during the flexing cycle. Flex life is poorer on aged stocks and on stocks with low sulfur. All rubbers but butyl suffer in flex life as the temperature is increased. Good dispersion of pigments is important in the prevention of flex-cracking and ozone cracking. Commercial antioxidants were classified as to chemical type and compared on the basis of protection as well as their staining properties.

Passes Dry-Clean Test

► A rubber elastic webbing that can be dry-cleaned as readily as a conventional fabric has been developed by the United Elastic Corp., Easthampton, Mass. Company officials called the development "a break-through in product improvement that is comparable to that made when antioxidant rubber thread was perfected over 25 years ago." The product is the result of more than twenty years of research by the Easthampton Rubber Thread Co. and rubber chemists of E. I. du Pont de Nemours & Co., who produced a type of neoprene suitable for the thread used in the webbing.

Buffalo Group Hears Neu

► The March 4 dinner-meeting of the Buffalo Rubber Group held at the Westbrook Hotel in Buffalo, N. Y., featured an address by Robert F. Neu of Enjay Laboratories, Linden, N. J. Mr. Neu spoke on "Dynamic Properties of Butyl Rubber as Related to its Applications." The technical session was followed by dinner, after which Vincent Richards, vice president of the Dunlop Tire & Rubber Corp., discussed "A Professional Look at Tennis Through the Years." Some ninety members and guests attended the meeting.

ARI Sponsors Symposium on Rayon Tire Yarn Progress

► Representatives of many of the country's leading rubber companies attended the technical symposium on "Rayon Tire Yarn Progress" which was conducted by the American Rayon Institute on January 23 at the Portage Country Club in Akron, Ohio. Dr. Walter J. Hamburger, director and treasurer of the Fabric Research Laboratories, Inc., served as symposium chairman. Dr. Hamburger was introduced by Benjamin Wood, executive director of the American Rayon Institute.

The symposium featured the presentation of four papers dealing with recent technical advances in rayon tire yarns presented by members of the research staffs of rayon fiber producers. The symposium began at 2:30 P.M. and concluded at 5:30 P.M. Following the symposium, a dinner was served.

The first paper presented at the symposium was entitled "Comparative Noise Levels of Rayon and Nylon Tires", by A. B. Baker (American Viscose). Mr. Baker described tests conducted by Lewis S. Goodfriend Associates to determine levels of noise resulting from the use of nylon and rayon passenger tires. The tires used were identical in tread design and were run on the same automobile over the same course under controlled conditions. Sound was recorded from the instant motion started and continued through a series of road and speed variations. It was found that nylon tires produced noises from 10 to 33 per cent louder than those produced by rayon tires.

A Texas tower, looming out of the sea 110 miles east of Cape Cod Mass., supports three radomes. The domes, rubberized fabric structures manufactured by the Firestone Tire & Rubber Co., house radar antennas which sweep the horizon for unidentified aircraft over the Atlantic. Pictured here is the tower unit of the 762nd Aircraft Control and Warning Squad of the U. S. Air Force.

Advances in Rayon Yarn

The next paper, delivered by A. Sandig (Courtaulds) was "Recent Advances in Rayon Tire Yarn". This paper reviewed factors stimulating the demand for stronger and better tire cords and the development of improved, super, super-super tire yarn types as well as the new rayons. The authors described the outstanding tensile and fatigue resistance properties of the new rayons and the possible application of their properties for making better and more economical rayon tires.

Progress in rayon tire yarn was ascribed to the intensive research in spinning technology as well as the fine structure of cellulose and regenerated cellulosic fibers. The relationship between the mechanical properties of tire yarns and the fine structure parameters were discussed and the technical and economical advantages of rayon tire yarn were summarized. Further progress was projected on the basis of the recent advances in spinning technique and fundamental knowledge of pulps and cellulosic fibers.

"A Study of the Impact Resistance of Rayon and Nylon Tire Cords", was prepared by J. P. Parker and S. Kemic and presented by F. B. Breazeale (American Enka). According to this paper, laboratory testing of tire cords has conventionally provided information on the loading curve at low rates of strain. Since in normal use, these cords can be subjected to much higher strain rates, laboratory apparatus has been constructed to give data on the breaking characteristics when the total break occupies only a few milli-seconds.

It was found that, in general, the total elongation of tire cord was reduced and the breaking strength increased as the rate of strain was increased. The authors stated that nylon cords have marked reduction in elongation and the total breaking energy drops sharply. Rayon cords showed a significant increase in total energy absorbed, as a result of increased modulus and breaking load.

In addition to these laboratory impact tests, actual tire tests were run, using tires designed to have equal carcass strengths. These tires were driven over a six inch curbstone at speeds of 20, 40 and 60 miles per hour, producing high speed forces sufficient to dent the wheel rim and damage the car frame. Careful inspection and testing of the cords in the area of impact failed to reveal any perceptive damage or loss in the cord properties in either rayon or nylon tires.

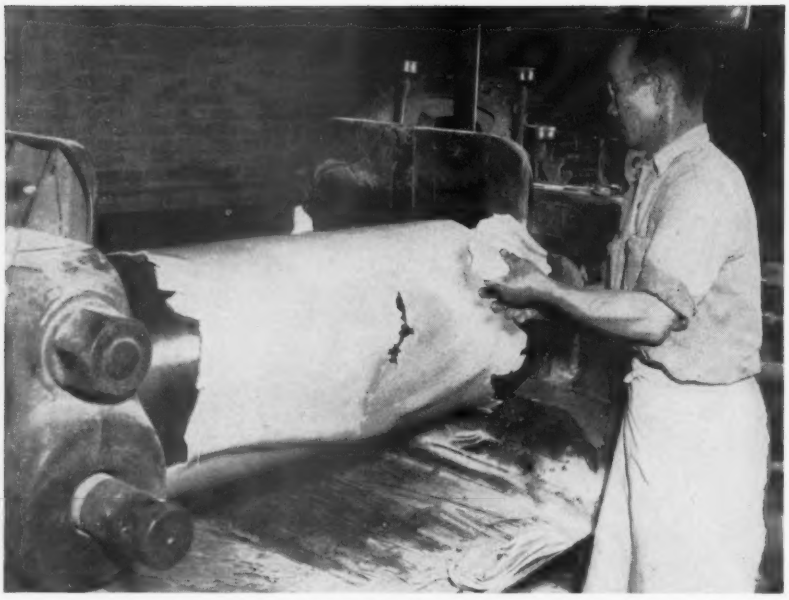
Cites Comparative Performance

The last paper, by H. W. Douglas and G. A. Farrell (Courtaulds), was entitled "Some Observations on the Comparative Performance of Rayon and Nylon Passenger Tires". The authors described screening trials, involving passenger tires constructed from 1250 denier super-super rayon and standard nylon and possessing similar carcass strengths which were carried out in Texas and Canada under high speed and normal passenger driving conditions.

An additional variable, that of a standard construction tire built with 1650 super-super rayon was also added to the Texas trials. Rayon tires exhibited low growth, low rate of wear, lower running temperatures and improved high speed performance, it was claimed. The potential of these super-super rayons in truck and high speed tires was also discussed.

RP Series For Polyethylene Film

► Claremont Pigment and Dispersion Corp., Long Island, N. Y., has developed the "RP" ink system for gravure printing on treated polyethylene which is said to offer all performance properties that printers expect of the conventional gravure inks. The new series includes a full color range including metallics. According to the company, these storage-stable concentrated inks offer the flexibility necessary to adjust inks for printing with engravings of any depth and pattern. The "RP" series is said to afford the following additional advantages: Inks can be thinned with standard thinners; Colors can be intermixed; No changes in printing procedures are necessary; Multicolor printing is possible at high speeds; There is excellent laydown of inks on film; Operations are relatively static-free; No alteration is required in forced drying equipment; They provide bright, intensely colored prints with sharp definition; Prints have good block resistance (No blocking exhibited in tests at 120°F. under 2½ pounds per square inch pressure for 24 hours); Prints have excellent scratch and abrasion resistance; Equipment is easily cleaned.



An operator is shown mixing the X-1960 compound into the gum stock right on the mill.

Molecular "Sieves" Find Use in Vulcanization

► The Silicones Division of the Union Carbide Corp., New York, N. Y., has now revealed the manner in which it "caged" a volatile, liquid catalyst used for curing vinyl-silicone rubber so that it could be marketed in convenient paste form. Early in 1956, the division introduced "X-1960" curing compound, a white paste containing di-tertiary-butyl-peroxide (DTBP). Before this compound was introduced it was generally recognized that the optimum properties of compounds made from these vinyl-containing gums were obtained by curing with DTBP. Because it is a volatile liquid, however, DTBP presented a safety hazard. In addition, it evaporated so quickly from catalyzed compounds that shelf life was limited to a matter of hours, Union Carbide officials state.

With the cooperation of the Linde Co., another division of Union Carbide, the Silicones Division perfected a method for adsorbing the liquid DTBP into a Linde Molecular Sieve. Molecular sieves are tiny new types of synthetic crystalline zeolites which have outstanding adsorbent qualities. They made an ideal carrier, the division states, for their alumino-silicate composition, with a particle size of one to two microns, allowed incorporation in silicone rubber compounds with no detrimental effects.

Molecular sieves also have the ability to retain the adsorbed material with small losses at storage temperature. At effective curing temperatures, the catalyst is released almost one hundred per cent. These and other qualities made it easy for fabricators to disperse the X-1960 catalyst into silicone rubber compounds at the mill.

To prepare X-1960, molecular sieves were loaded with fifteen weight-per cent DTBP and were then compounded with Union Carbide "W-96 Gum." This became a stiff white paste which was shipped to fabricators in one gallon cans weighing five pounds. The recipe was balanced so that the ultimate hardness of the compounds catalyzed with X-1960 would not be changed.

X-1960 has made possible simplified curing of large masses of rubber. Thus, large silicone covered rolls were made for use in textile, plastics, and paper industries. In the molding of large parts, X-1960 allows a one step postcure in place of a long scheduled step cure. In molding gaskets, use of X-1960 not only assures the lowest possible compression set, but also minimizes fabrication problems such as scorching, officials of the silicones division state.

General Tire and Rubber Plans Distribution Center

► General Tire & Rubber Co., Akron, Ohio, has announced plans to build a new 85,000 square-foot Eastern distribution center in East Rutherford, N. J. The center is expected to effect substantial economies in distribution costs and will aid General Tire dealers' services to customers in the Metropolitan New York market. The General Tire building, going up in the center of New Jersey's principal highway grid, will be within eight miles of the Lincoln and Holland Tunnels, the George Washington Bridge, the Port of Newark and airport facilities. Rail transportation of the Erie Railroad will serve the site of the East Rutherford center.

Emery Buys Vopcolene Division

► Emery Industries, Inc., Cincinnati, Ohio, has announced the acquisition of the Vopcolene Division of the Vegetable Oil Products Co. Terms of the transaction were not disclosed. A. W. Schubert, executive of Emery, said the transaction becomes effective April 1, and will include the entire property, production facilities, trademarks, etc., of the Vopcolene Division in Los Angeles, Calif., which will become the Vopcolene Division of Emery Industries, Inc. No changes in personnel are contemplated and the operation will remain under the direction of Carl Williams, present manager. Emery plans substantial expenditures for expansion and improvement of production facilities. Mr. Schubert says that this is the third major expansion of Emery in the last two years. The other two were the acquisition of the fatty acid manufacturing facilities of S. F. Lawrason and Co., Ltd., in London, Ont., and a multi-million dollar joint venture with Monsanto Chemical Co., which involves the construction of a new plant in Nitro, West Va., to fractionate tall oil into rosin and fatty acids.

Naugatuck Marvinol VR-51

► A new vinyl plastisol "stir-in" resin called "Marvinol VR-51", designed to release air trapped in liquid plastisols during compounding and pouring, has been developed by the Naugatuck Chemical Division of the U. S. Rubber Co., Naugatuck, Conn. Said to minimize rejects in slush and rotational molding, use of the new material in the production of plastic dolls and boots has resulted in the manufacture of dolls with smooth, unblemished contours and boots free of weak spots caused by entrapped air. Air bubbles rise to the surface seconds after the mold has been filled. According to the company, stop-watch laboratory tests show that the new resin has faster air release qualities than any plastisol resin now on the market. Marvinol VR-51 is also low in viscosity; forms compounds that flow easily to fill all sections of the mold quickly, and drains off rapidly when molds are filled. Currently utilized by toy and footwear manufacturers, the material is also being evaluated for vinyl foams made by the Elastomer Process.

FMC Offers Methallyl Acetate

► FMC Organic Chemicals Division of Food Machinery and Chemical Corp., New York, N. Y., has announced the availability of methallyl acetate (Isobutenyl acetate) in a 97 per cent minimum purity grade. The product is used primarily as a monomer in polymerization reactions. It is expected to be helpful in the preparation of methallyl derivatives in specialty rubbers, safety glass liners, molding powders, castings and laminates, adhesives, protective coatings, polymers, pharmaceuticals, insecticides and specialty chemicals. The company also produces methallyl chloride in tonnage quantities and methallyl alcohol in 98 per cent purity.

DuPont Reveals Details on LCM Neoprene Cure

► As briefly announced in the February, 1958, issue of RUBBER AGE, E. I. du Pont de Nemours & Co., Inc. of Wilmington, Del., has developed a new method for the continuous vulcanization of neoprene extrusions. Additional details on the process have now been made available and the first complete paper on this subject appears elsewhere in this issue. In practice, the new process employs a liquid curing medium (LCM) which may be either an organic or an inorganic liquid or a molten metal, maintained at an extremely high temperature (400-600°F.).

The uncured neoprene strip is fed directly from the extruder into the curing chamber. DuPont states that in many cases it may be desirable to coat the uncured surface with talc or other materials before it enters the curing medium. Good cures which have an excellent surface appearance are obtained within seconds and the finished extrusion can then be directly coiled or cut to length for shipment. Although the limitations of the system have not been fully explored, relatively complicated cross-sections of neoprene extrusions have been successfully cured on laboratory equipment, the company advises.

It is emphasized that the use of the system provides for many advantages, including lower production costs. These lower production costs, DuPont states, may be expected due to reduced labor requirements and to the shorter processing time required, i.e., period of time required for the stock to pass from the extruder warm-up mill to the time the finished extrusion reaches the shipping area. Still another important saving may be realized by taking advantage of the relatively small floor space required for this type of integrated extrusion and vulcanization process.

Surface Degradation Reduced

Another inherent advantage of the LCM principle of curing is the reduction in surface degradation normally associated with atmospheric exposure at high temperatures. In the LCM process, oxygen is physically excluded from the surface of the section being subjected to heat by the liquid curing medium thereby minimizing oxidative degradation.

The alloys employed in the process, DuPont notes, should be stable at temperatures above 600°F. as cures at this temperature are possible from a compound design standpoint. The material should also have a low oxidation rate to minimize oxide formation and bath material loss. In addition, the bath material should be relatively non-toxic, and the material selected should not contribute to the discoloration of light colored extrusions.

The company further states that there are two basic factors that must be considered for the successful utilization of the LCM method. One is the optimum cure rate for maximum production without scorching difficulties. The other is elimination of porosity by proper compounding and extrusion techniques. Generally speaking, a very fast cure rate is desirable for a high production rate in a curing bath of practical length. The thioureas and the aldehyde amines are very fast accelerators for neoprene.

The cure rate can be further increased by changing the metal oxide. A combination of five parts of litharge and five parts of zinc oxide is recommended for black or dark colored compounds. For light colored compounds, a combination of two parts of magnesia and five parts of zinc oxide is recommended to avoid discoloration.

Rapid Extrusion Rate

The fast curing compounds will cure in about 20 seconds at 425°F. In a five-foot laboratory curing tank, this allows an extrusion rate of fifteen feet per minute. It is possible to extrude and cure neoprene compounds using conventional acceleration. Laboratory work has shown such compounds to require about twice the cure time at any given temperature to produce the same rate of cure. A good state of cure can be obtained, without increasing the cure time, by increasing the cure bath temperature roughly 100°F.

A fast cure rate is also helpful in eliminating porosity, but the most effective method of eliminating porosity is by increasing the uncured viscosity of the compound. The higher viscosity enables the extruder to work the entrapped air out of the stock during the extrusion process.

DuPont declares that where sponge extrusions are concerned, the continuous extrusion and curing method is a rapid and economical means of preparing sponge products having a wide variety of shapes, sizes, and physical properties.

Phoenix Retread Plant Underway

► Construction has started on a new retread plant that the B. F. Goodrich Tire Co. will open in Phoenix, Ariz., to serve a four-state area comprising Arizona, New Mexico, Nevada and Utah. Company officials said the lease agreements call for a 10,000 square foot concrete block building. The plant will be equipped to handle large off-road tires used in construction work in the Phoenix area. The new plant will be situated on property that will allow for a 50 per cent expansion when needed.

Argus Expands Plant Facilities

► Argus Chemical Corp., Brooklyn, N. Y., has announced plans to expand plant facilities with the construction of a new plant to be located on a 3½ acre tract across the street from its present building. The new plant will provide additional facilities for the production of "Drapex" plasticizers and "Mark" stabilizers, and extensive areas for the manufacture of fatty ketones. In addition, the new facility will house Argus' shipping facilities.

Hecht Rubber Expands Operations

► With the purchase of its own building early this year, Hecht Rubber Co., Inc., Jacksonville, Fla., completed the expansion of its rubber and plastics operations. The Fabrication Department has been enlarged with specially designed equipment installed to facilitate the production of engineered products used in guided missiles, electronics, jet planes and other highly specialized items used in commercial and industrial projects.

According to Milton Hecht, president and manager of the firm, the "move was made of necessity, since most new scientific and engineered improvements in today's industry entail the application of newly compounded rubber synthetics vital to their end use." Mr. Hecht believes that while natural rubber will continue to be an important fabrication requirement, it is already surpassed by synthetics. After a study of the detrimental effects of the southern sun, moisture and air on rubber, the firm began to supply industry with rainwear, aprons, gloves and boots designed to meet special conditions. Industrial hose and fittings for the passage of water, air, sand, paint and chemicals are stocked in what Mr. Hecht believes is the "largest rubber supply warehouse in the Southeast."

C. I. C. Rubber Division Plans Montreal Meeting on May 28

Morning and Afternoon Sessions To Feature Nine Interesting Papers

► The Division of Rubber Chemistry of the Chemical Institute of Canada has announced that its annual convention will be held on Wednesday, May 28th, at the Royal York Hotel, Toronto, Ont., in conjunction with three-day meeting of the parent group which will be held on May 25 to 28. Morning and afternoon technical sessions have been scheduled along with a Rubber Division luncheon. Tickets for the luncheon will be sold in advance and may be obtained from Carl Croakman, president of Columbian Carbon (Canada) Ltd. The afternoon technical session will be followed by a reception, sponsored by the president of CIC, and later the CIC banquet.

The morning session will be chaired by Wray Cline (Canadian General Tower). Papers scheduled for this session will include: "Factors Influencing Cut Growth Testing", by W. A. Gurney and I. C. Cheetham (Dunlop Research Center—England); "Studies of Synthetic Polymers with the Electron Microscope", by W. Rupar and L. Breitman (Polymer); "Some Studies on the Dispersion of Carbon Black in Rubber", by C. W. Sweitzer, W. M. Hess and J. E. Callan (Columbian Carbon); "Effects of Radiation on Raw and Vulcanized Elastomers", by T. C. Gregson, W. R. Miller, L. B. Bangs and S. D. Gehman (Goodyear), and "Recent Advances in Rayon Tire Yarn", by A. Sandig (Courtaulds (Canada) Ltd.).

L. T. Rosser (Mansfield Rubber—Canada) will be the luncheon speaker and Wilf Jonah (Louis Specialties) will preside at the afternoon technical session. The following papers will be presented: "Factors Affecting the Physical Properties of Furnace/Butyl Rubber Vulcanizates", by D. F. Walker, Eli M. Dannenberg, B. B. S. T. Boonstra (Cabot); "Lignin-Rubber Technology", by D. W. MacGregor, L. H. Krichew and T. R. Griffith (National Research Council—Ottawa); "Maleic Anhydride Modified Elastomers", by H. W. Paxton, R. H. Snyder, P. F. Gunberg and P. O. Tawney (U. S. Rubber Research Center), and "The Pneumatic Tire, Yesterday, Today and Tomorrow", by James E. Corey (Firestone).

Factors Influencing Cut Growth Testing. *W. A. Gurney and I. C. Cheetham (Dunlop Research Centre, Birmingham, England).* A modified Rainier-Gerke apparatus has been used for measuring cut growth. In this test the rate of growth of a standard cut initiated in a groove test piece is studied as a function of flextures between defined angles, which can be changed as desired. As in other similar tests, a wide variability is associated with the results. Work, started as an investigation of possible sources of test variability, has led to information on factors dominant in cut growth.

The rate of cut growth is shown to be dependent upon the flexing angle and critically dependent on the "minimum angle." The growth rate shows a sharp peak at small positive values of minimum angle and subsidiary peak at small negative angles. These observations are explained on a theory of molecular chain entanglement and permanent set. Furthermore, it is found that the cut growth rating of compounds of different polymers can be changed or even reversed by modifying the initial and final angles between which the samples are flexed. Other experiments have shown that the rate of cut growth is affected by prescorch before cure, a very short prescorch, surprisingly, having a beneficial effect.

Some Studies on the Dispersion of Carbon Black in Rubber. *C. W. Sweitzer, W. M. Hess and J. E. Callan (Columbian Carbon Co., New York, N. Y.).* The importance of adequate dispersion of carbon black in rubber compounds has been long recognized. The various facets of this subject are reviewed with particular emphasis on the studies carried out in the laboratories of the Columbian Carbon Co. A practical and useful photographic method for measuring the macroscopic state of carbon black dispersion in rubber stocks is described. These macroscopic dispersion differences are shown to play a major role in the performance of most factory compounds, particularly tread stocks. Microscopic methods employed for the investigation of the ultimate state of carbon black dispersion are also described and the results discussed in terms of relationship to compound properties.

Employing these techniques, the effect of various factors on the state of dispersion was investigated. These factors included the type of polymer, the grade and loading of carbon black, a variety of dry mixing procedures and wet masterbatching. The advantages in terms of compound properties, resulting from good dispersions of carbon black, are summarized. The role played by the state of carbon black dispersion in the development of reinforcement is discussed briefly.

Studies of Synthetic Polymers with the Electron Microscope. *W. Rupar and L. Breitman (Polymer Corp., Ltd., Sarnia, Ont.).* The large magnifications available with the electron microscope have made it possible to examine structural features of synthetic polymers in their different states. The determination of particle sizes and the distribution of a latex is of considerable technical and theoretical importance. A latex with a narrow particle distribution has been prepared and is used as a calibration standard. Accurate analysis of particle size distribution of Hevea and special synthetic latices with wide distribution presented a sampling problem. A fractional creaming technique has been developed to prepare samples which are easily analyzed. Extensive use was made of positive carbon replicas to examine packing characteristics of film forming latices with or without pigments. The electron microscope was also used to measure the particle size distribution of rubber fillers. Techniques have been evolved to determine the state of aggregation and dispersability of various fillers which are added to the rubber.

Effects of Radiation on Raw and Vulcanized Elastomers. *T. C. Gregson, W. R. Miller, L. B. Bangs, and S. D. Gehman (Goodyear Tire & Rubber Co., Akron, Ohio).* Radiation cured rubber has not yet shown physical properties comparable to those obtained through thermal vulcanization. In searching for ways to improve radiation vulcanization, a study was made of the effect of the following variable on the physical properties of radiation cured elastomers: (1) tread stock ingredients, (2) radiation damage inhibitors, (3) initial molecular weight, and (4) environment.

Tread stock formulations give superior properties in radiation vulcanization compared to the black masterbatch, an effect attributed almost entirely to the zinc oxide. Some radiation damage inhibitors, when incorporated in the raw compounds, give improved properties in the vulcanizates, but may also inhibit crosslinking during the early stages of vulcanization. A certain amount of milling before irradiation seems to be beneficial: excessive milling leads to a definitely inferior product. Stocks exposed in air and in nitrogen have shown no significant differences in rate of crosslinking or in properties.

Heat vulcanized elastomers have been irradiated to investigate the effects of (1) environment, (2) state of cure, (3) radiation damage inhibitors, and (4) post-irradiation changes on the physical properties of such stocks. Exposure in nitrogen results in less damage than an equivalent dose in air. The temperature during irradition is a signficant factor in radiation damage.

Recent Advances in Rayon Tire Yarn. ***A. Sandig (Courtaulds (Canada) Ltd., Montreal, Que.).*** Factors stimulating the demand for stronger and better tire cords such as more powerful cars, super highways, changed driving habits, power steering and power brakes, lower inflation pressures and 14" wheels are reviewed. This challenge is being met by the rayon tire yarn industry through constant improvement of its product. Development of improved, super, super super tire yarn types as well as the new rayons is discussed. The outstanding tensile and fatigue resistance properties of the new rayons are described and the possible applications of their properties for making better and more economical rayon tires are suggested. The recent progress in rayon tire yarn is ascribed to the intensive research in both spinning technology as well as the fine structure of cellulose and regenerated cellulosic fibers.

The relationship between the mechanical properties of tire yarns and the fine structure parameters such as orientation, crystallinity, lateral order, secondary swelling and degree of polymerization are discussed. The technical and economical advantages of rayon tire yarn are summarized and further progress is projected on the basis of the recent rapid advances in spinning techniques and in fundamental knowledge of pulps and cellulosic fibers.

Factors Affecting the Physical Properties of Furnace Black-Butyl Rubber Vulcanizates. ***Donald F. Walker, Eli M. Dannenberg and B. B. S. T. Boonstra (Godfrey L. Cabot, Inc., Cambridge, Mass.).*** A study has been made of the factors affecting the behavior of furnace blacks in butyl rubber. Among these are the loading of the black in the compound, the recipe used, the effect of heat treatment during mixing, and the chemical nature of the black surface.

Lignin-Rubber Technology. ***D. W. MacGregor, L. H. Krichew, and T. R. Griffith (National Research Council, Ottawa, Ont.).*** Although lignin may be used as a substitute for carbon black in many rubber products, including tires, it is different from carbon black in compounding requirements. Lignin, coprecipitated with rubber from latex by the addition of acid, may be looked upon as an organic acid and as such has a delaying effect upon vulcanization. This delaying effect is due not to the acid as such, but to H_2S which is developed in excessively large portions during vulcanization in an acid medium. Certain metallic oxides, such as those of lead, copper, and bismuth, which have superior ability to precipitate H_2S in an acid medium, have the ability to counteract acidity in rubber far beyond what would be expected solely from their ability to neutralize acid.

Vulcanization of lignin compounds is preferably carried out with strong acceleration. There are advantages in the use of metallic oxides such as those just mentioned, particularly litharge. If slow cures are desired, as in tire compounds, strong accelerators are still advisable, but in reduced quantity. Sulfur dosage should also be reduced to a minimum of around 1 p.h.r.

Factory processing requirements will be discussed, and the differences in physical properties between factory-prepared and laboratory-prepared compounds will be pointed out. Oxidized lignin powder, although it is not hygroscopic, and will lose adsorbed water on contact with air, still has an enormous capacity for water. Such powder is dry in appearance and flows freely when containing up to 100 per cent of its own weight of water. Oxidized lignin powder, in quantities around 5 p.h.r., may be thus used for adding water to rubber compounds, and when this is done the expected increased cure rate is obtained.

Maleic Anhydride Modified Elastomers. ***H. W. Paxton, R. H. Snyder, P. F. Gunberg and P. O. Tawney (U. S. Rubber Co., Wayne, N. J.).*** This paper describes practical laboratory and pilot plant methods for the preparation of several maleic anhydride modified natural and synthetic elastomers. The rubbers produced by these methods are substantially free of gel. New curing systems for these chemically modified rubbers are discussed, and changes thereby produced in the physical properties of the vulcanizates are presented. For example, under certain conditions, enormous improvements in flex life and tear resistance are effected.

The Pneumatic Tire—Yesterday, Today and Tomorrow. ***James F. Corey (Firestone Tire & Rubber Co., Akron, Ohio).*** Since the discovery of the wheel, it was pre-ordained that rubber would play an important role in the transportation of man and his materials. Hand in hand with the expansion of our civilization we have built more highways and demanded speed in even greater measure. The part played by the rubber tire in meeting these requirements is a story of constant search for new materials, better application and engineering of a product which is a cornerstone in the structure of transportation throughout the world.

As advances and improved products are made available, it is the responsibility of the rubber industry to educate the using public. The people must be taught to recognize its limitations as well as its capabilities. Tires, as known today, come in a range of sizes from the small industrial which can be held in one hand to the giant earthmovers, some of which are up to ten feet in diameter, four feet across and weighing over one and one-half tons. From this wide range of tire sizes and specialized types one must know how to select the proper tire for each job and how to use it once the investment is made. It is the intent of this paper to familarize the public with aspects of the tire industry and tire application so they may use the product to a better advantage.

CEREBRAL PALSY

EVERY 53 MINUTES

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OR SEND YOUR CONTRIBUTION TO "PALSY" CARE OF YOUR LOCAL POSTMASTER

Forms Parker Seal Unit

► Parker-Hannifin Corp. of Cleveland, Ohio, has announced that its Parker Rubber and Franklin C. Wolfe Divisions have been united in a single major unit named the Parker Seal Co. By combining present operations of the two divisions at this time, the firm hopes to provide greater technical and sales attention to this rapidly growing part of the organization. Paul F. Smith has been named general manager of the new division with administrative headquarters in Culver City, Calif. Mr. Smith was general manager of the Franklin C. Wolfe Division since its acquisition by Parker-Hannifin in 1957. Scott A. Rogers, who was formerly manager of Parker Rubber, will continue in Cleveland as assistant general manager of the new division with direct responsibility for eastern operations. T. J. McCuistion, who was sales manager of Parker Rubber, was appointed sales manager of the Parker Seal Cleveland headquarters. Col. Franklin C. Wolfe, formerly president of the Franklin C. Wolfe Division, was named assistant to Parker-Hannifin president S. B. Taylor in defense liaison and planning for the whole corporation.

Appointed Emery Representative

► Malcolm R. Tucker, formerly supervisor in the Production Department for Emery Industries, Inc., Cincinnati, Ohio, has been appointed fatty acid sales representative in the Cincinnati territory for the company. He will be responsible for the sales of Emery's complete line of fatty acids in West Virginia, eastern Indiana and Kentucky, southwestern Michigan and all of Ohio except the northeast section. Associated with Emery for 10 years, Mr. Tucker is a graduate of Wilmington College, Wilmington, Ohio, and attended the University of Cincinnati and the University of Dayton.

Financial Averages of Manufacturers of Rubber Products for 1956

The Chemical Division of the National Credit Office, New York, N. Y., has published statistics showing financial statement averages of companies engaged in the manufacture of rubber products. The fiscal statements of the concerns included in each group have been combined and then averaged. Percentages appearing opposite each dollar amount indicate: for the Balance Sheet, the relationship to working capital; for the Operating Items, their relationship to net sales.

	Tire Mfrs. Exclusive of "Big 4"		"Big 4" Tire Mfrs.		All Tire Mfrs.		Rubber Insulated Wire-Cable Mfrs.		Mechanical Rubber Goods Mfrs.		Mfrs. of Other Rubber Prods.		All Rubber Products (Including Tires)	
Cash & Govt. Securities	$ 2,572,725	15%	$ 37,782,025	12%	$ 14,309,158	12%	$ 4,872,717	38%	$ 596,683	40%	$ 356,976	38%	$ 3,751,444	14%
Receivables	15,050,362	88	163,313,575	52	64,471,433	56	5,969,300	47	619,142	41	508,188	54	14,118,163	54
Merchandise	16,271,513	96	239,552,600	76	90,698,542	78	13,662,316	107	974,392	65	755,040	80	20,450,466	79
Current Assets	33,894,600	199	440,648,200	140	169,479,133	146	24,504,333	192	2,190,217	146	1,620,205	172	38,320,073	147
Plant & Equipment	14,347,600	85	201,371,950	64	76,689,051	66	15,343,317	121	994,346	66	1,197,859	128	17,907,736	70
Investments	4,275,612	25	24,567,275	8	11,039,500	10	1,674,467	13	163,712	11	6,824	1	2,484,168	9
Other Assets	476,913	3	4,942,700	2	1,965,508	2	869,383	7	87,183	6	88,718	9	549,203	2
Total Assets	52,994,725	312%	671,530,125	214%	259,173,192	224%	42,391,500	333%	3,435,458	229%	2,913,606	310%	59,261,180	228%
Trade Debt	7,973,800	47%	66,375,100	21%	27,440,900	23%	3,192,216	25%	218,650	15%	206,782	22%	6,054,356	23%
Loans Payable	6,048,175	35	5,685,850	2	5,927,400	5	1,926,467	15	131,554	9	68,282	7	1,474,673	5
Taxes	2,417,725	14	42,950,375	14	15,928,608	14	4,469,050	35	202,204	13	290,842	31	3,860,251	15
Other Liabilities	506,875	3	12,622,950	4	4,545,567	4	2,197,167	17	138,488	9	116,429	12	1,237,844	5
Current Liabilities	16,946,575	99	127,634,275	41	53,842,475	46	11,784,900	92	690,896	46	682,335	72	12,627,124	48
Funded Debt	11,735,750	69	145,048,750	46	56,173,417	49	1,271,000	10	98,925	7	202,036	22	11,652,810	45
Reserves	468,488	2	40,638,900	13	13,858,625	12	311,133	3	542	0	10,206	1	2,853,505	11
Net Worth	23,843,912	142	358,208,200	114	135,298,675	117	29,024,467	228	2,645,095	176	2,019,029	215	32,127,741	124
Liabilities & Net Worth	$52,994,725	312%	$671,530,125	214%	$259,173,192	224%	$42,391,500	333%	$3,435,458	229%	$2,913,606	310%	$59,261,180	228%
Working Capital	16,948,025	100%	313,013,925	100%	115,636,658	100%	12,719,433	100%	1,499,321	100%	937,870	100%	25,962,949	100%
Working Capital Turnover (Times)	4.9		3.2		3.4		6.2		3.9		5.9		3.6	
Net Sales	83,368,125	100%	1,024,842,975	100%	397,193,075	100%	78,503,233	100%	5,966,025	100%	5,535,959	100%	92,790,376	100%
Gross Profit	15,103,913	18.1	261,491,625	25.5	97,233,150	24.5	14,204,583	18.1	1,423,196	23.8	1,243,782	22.5	22,158,073	23.9
Expenses (Incl. Taxes)	12,797,525	15.3	211,834,050	20.6	79,143,033	20.0	9,541,967	12.1	1,177,488	19.7	985,100	17.8	17,830,078	19.2
Taxes	2,273,913	2.7	49,590,950	4.8	18,046,408	4.5	4,627,350	5.9	237,596	4.0	278,106	5.0	4,317,815	4.6
Group Net Profit	2,306,388	2.8	49,657,575	4.8	18,090,117	4.5	4,662,617	5.9	245,708	4.1	258,682	4.7	4,327,995	4.7
Current Ratio (%)	200.0		345.2		314.8		207.9		317.0		237.5		303.5	
Liquid Assets to Curr. Debt. (%)	104.0		157.6		146.3		92.0		176.0		126.8		141.5	
Collection Period (Days)	66		59		60		28		38		33		55	
Mdse. into Sales (Times)	5.1		4.3		4.4		5.7		6.1		7.3		4.5	
Net Profit to Net Worth (%)	9.7		13.9		13.4		16.1		9.3		12.8		13.5	
Dividends	9,062		25,429,075		9,080,492		1,688,400		74,917		134,976		2,087,861	

Robert F. Smith

Named Worthington President

► Worthington Ball Co., Elyria, Ohio, has announced the election of Robert F. Smith, formerly executive vice-president, as president succeeding Harry M. Naugle, who has been elected chairman of the board. In other executive changes Myron E. Foote, secretary and treasurer has been elected vice-president and treasurer. J. C. Brydon former vice-president of sales, has retired but will continue to serve the company in a consulting capacity. Lloyd R. Barton, assistant sales manager, has been appointed general sales manager and King E. Fauver has been elected secretary. Mr. Fauver is associated with the legal firm of Fauver & Fauver, legal counsel for the company.

Mr. Smith, formerly vice-president in charge of production, joined Worthington in 1945 after many years experience. Starting as general superintendent, he soon became vice-president in charge of production and later, was named executive vice-president and a director. Mr. Naugle joined the company in 1927 as a director and was elected president in 1934. Mr. Foote, who has had a long career in financial work, started with Worthington in 1947 as assistant secretary and assistant treasurer. He was elected treasurer in 1950 and secretary and treasurer in 1956. Mr. Brydon joined the company in 1927 and has devoted his entire career to sales work, and Mr. Barton has been associated with Worthington in a sales capacity since 1929.

EF-4527 Silicone Additive

► Dow Corning Corp., Midland, Mich., has announced the development of a new silicone additive for cell structure control called "EF-4527". An oil-in-water 50 per cent emulsion of silicone fluid, the new material is said to be compatible with most catalysts and to remain uniformly dispersed for as long as two weeks. The new additive is easily dispersed into a wide variety of commonly used catalysts and final foams incorporating EF-4527 are said to be identical in every respect to those made with conventional silicone additives.

LABOR NOTES

► Ratification of a contract by United Rubber Workers Local 557 has ended a recent three-week strike against the Chardon Rubber Co. of Chardon, Ohio. Striking employees approved the new agreement unanimously. The URW was certified as the bargaining agent at the plant last Fall, and negotiations had been underway since last November. About 365 employees went out on strike February 25. The settlement was said to revolve about an "economic package" of between eight and nine cents per hour.

► A House Labor Subcommittee has voted down a proposal for public hearings on the dispute between the United Rubber Workers and the O'Sullivan Rubber Corp. of Winchester, Va. Officials of the URW recently told a National Labor Relations Board trial examiner that picketing of the O'Sullivan Rubber Corp. has been continued in order to persuade company employees to join the URW so that another election can be held. Last fall, the URW was defeated in an election at O'Sullivan Rubber and URW officials feel that had employees been aware of the provisions of the Taft-Hartley Law, the outcome of the vote would have been different.

► A pension and insurance bargaining program, including a full company-paid surgical plan, was adopted as a goal by URW local delegates who met recently in Cleveland, Ohio. Besides surgical coverage improvement, the URW platform will include proposals for increased life insurance; accidental death, sick and accident benefits; improved payments for doctor visits; improved pensions, and benefits covering rehabilitation care.

General Develops New Tire

► The "Traction Rib Special Service," a new truck tire that will give up to ten per cent greater original mileage than the "Highway" tire it replaces, has been announced by the General Tire & Rubber Co., Akron, Ohio. The Traction Rib Special Service has a wider, deeper tread than the Highway tire, while the tire body is of the same standard construction and the price remains unchanged. Company officials said the new tire is being offered to fill a growing need among truck operators for longer original tread service on all of the tires they purchase. The Traction Rib Special Service is now in production at the Akron, Ohio, and Waco, Texas, General Tire plants.

Goodall-Sanford Appointments

► Vinyl Fabrics Division of Goodall-Sanford, Inc., New York, N. Y., has announced two new appointments. C. J. Arsenault has been named sales representative in the New England area, while Larry Weisberg has been appointed sales agent covering Ohio and Michigan. The company says that the new staff additions are in keeping with the division's increased sales efforts on its expanded ranges of vinyl fabrics.

Theodore G. Hagen

Named Day Sales Engineer

► Theodore G. Hagen has been appointed sales engineer to head a new sales office which has been opened in St. Louis, Mo., by the J. H. Day Division of the Cleveland Automatic Machine Co., Cincinnati, Ohio. He will cover Missouri, Kansas, Arkansas and southern Illinois, representing the full line of J. H. Day mixing, dispersing, sifting, milling and allied equipment. Mr. Hagen has been a member of the Day organization for 17 years, having worked in the Manufacturing, Production, Service and Sales Departments. He is a graduate of the College of Engineering, University of Cincinnati.

Appointed Research Manager

► Dr. George C. Schweiker has been appointed to the new position of manager of research for the Velsicol Chemical Corp., Chicago, Ill. The appointment was made as a part of the company's general expansion in research and product development. Dr. Schweiker was formerly associated with the Hooker Electrochemical Co., where he served as supervisor of polymer research. Previous to that, he was an instructor in chemistry at Drexel Institute of Technology in Philadelphia. Dr. Schweiker received his Ph.D. from Temple University in 1953. He is a member of the American Chemical Society, Sigma Xi, and the American Association for the Advancement of Science.

Alperin Elected Board Chairman

► Max Alperin, formerly executive vice-president and general manager, has been elected chairman of the board and chief executive officer of the Royal Electric Corp., Pawtucket, R. I. Associated with the organization for more than thirty years, Mr. Alperin has served longer than any other employee. He joined the firm shortly after it was founded in Boston and moved to Pawtucket, R. I., when Royal established its first plant there. Mr. Alperin has served in many capacities and has been a member of the board of directors for many years.

Executive Vice-Presidents Named

► American Cyanamid Co., New York, N. Y., has announced the election of Kenneth H. Klipstein and George R. Martin as executive vice-presidents. Mr. Klipstein, who joined the company in 1933, became a vice-president and director in 1957. He has served as assistant general manager of the former Calco Division and as general manager of the Research Division. During 1951 and 1952, Mr. Klipstein was a director of the Chemical Division and assistant administrator of the Chemical, Rubber and Forest Products Bureaus of the National Production Authority. He received a B. A. degree in economics and an M. A. degree in chemistry from Princeton University. Mr. Klipstein is a member of the American Chemical Society, American Institute of Chemists, American Institute of Chemical Engineers, American Association of Textile Colorists and Chemists, Commercial Chemical Development Association, Chemical Market Research Association, Society of the Chemical Industry and the New York Academy of Sciences.

Mr. Martin joined American Cyanamid in 1927 to organize a Legal Department and served as its head until 1951. He has been a member of the board of directors since 1928 and a vice-president for 13 years. Mr. Martin received his B. A. and L. L. B. degrees from the University of Virginia and was a member of Phi Beta Kappa. Following graduation, he practiced law with his brother in Norfolk, Va., until 1926, when he became an assistant city attorney there.

Jet Airliner Tires Developed

► High-speed aircraft tires, capable of withstanding landing and take-off speeds up to 200 miles per hour, have been developed by the Firestone Tire & Rubber Co., Akron, Ohio. W. E. Lyon, director of tire engineering and development, said that the tires will be original equipment on the Boeing 707—the United States' first jet airliner. The first production model of the new jet liner is currently undergoing flight tests and is scheduled to go into operation the latter part of 1958. Eight of the new Firestone tires, known as Sky Champions, will be used on the airliner's dual-tandem landing gear. The company said the new tires have successfully passed 200 mile per hour qualification tests—the fastest qualification ever required for commercial aircraft tires.

Carbide Polyox Coagulant

► Union Carbide Chemicals Co., New York, N. Y., has introduced a new organic flocculating agent which is said to have exceptional ability to increase the settling and filtration rates of dispersed solids. Called "Polyox Coagulant", the new product is a high molecular weight grade of the company's Polyox water-soluble resins. Union Carbide Chemicals says that the new material is effective over a wide pH range; has a high flocculation efficiency at low weight concentrations, and adsorbs rapidly on many types of suspended solids.

Help Wanted At U.S. Naval Base

► The Naval Air Material Center, U.S. Naval Base, Philadelphia 12, Penna., is currently seeking engigineers (aeronautical, electronic, industrial, general, mechanical and power plant), electronic scientists, metallurgists, physicists, and technologists. Vacancies exist for professional personnel in the noted positions with starting salaries ranging from $4,480 to $8,645 per annum. The Naval Air Material Center is currently engaged in an extensive program of aeronuatical research, development, experimentation and test operations for the advancement of Naval aviation. Personnel are needed for work on projects involving modification, overhauling and testing of aeronautical equipment, materials, accessories, power plants, launching and arresting devices, and for modification and structural testing of aircraft. Also, for work involving the basic design of catapults, launchers, arresting gear and their component parts; test and development work at shore stations and on board U. S. Navy ships; evaluation of new equipment and establishment of performance parameters, and applied research on the many problems relevant to this field. Interested persons should file an Application for Federal Employment, Standard Form 57, with the Industrial Relations Department, Naval Air Material Center, Naval Base, Philadelphia 12, Penna. Applications may be obtained from the above address or information as to where they are available may be obtained from any first or second class post office.

Delaney Named to New Post

► Goodyear International Corp., Akron, Ohio, has announced the appointment of Edwin J. Delaney to the newly created position of assistant general manager. Mr. Delaney, formerly vice-president and managing director of Goodyear-Argentina, joined Goodyear's export operations as a sales trainee in 1937 and was assigned as field representative for Central America two years later. On loan to the U. S. Army Engineers in Panama in 1942, he was in charge of the transportation of materials and personnel in connection with construction of the Canal Zone's outlying defense bases. After the war, he was Goodyear's Central-American field representative and was appointed general manager for Goodyear-Colombia in 1947. He received a B.A. degree in International Trade from the University of Wisconsin in 1937. In Argentina, Mr. Delaney was vice-president of the U. S. Chamber of Commerce, and was on the board of directors of the American Club.

Goodrich Transfers Personnel

► B. F. Goodrich Tire Co., Akron, Ohio, has announced that Philip H. Zuiderhoek, formerly manager of the Tuscaloosa, Ala., tire plant has been named Akron tire plant superintendent, while Fred N. Lehmann, previously Akron tire plant superintendent, has been transferred to the Tuscaloosa plant as manager. Mr. Zuiderhoek joined the company in 1926 as a factory employee in the Akron plant. He has held various supervisory positions at tire company plants in Oaks, Penna., and Los Angeles and the Goodrich operated shell loading facilities at the Lone Star Defense plant at Texarkana, Texas. In 1943, Mr. Zuiderhoek returned to Oaks, Penna., as general foreman of the tire room, and in 1945, he was transferred to the Miami, Okla., tire plant as production superintendent. He became Tuscaloosa plant manager in 1948.

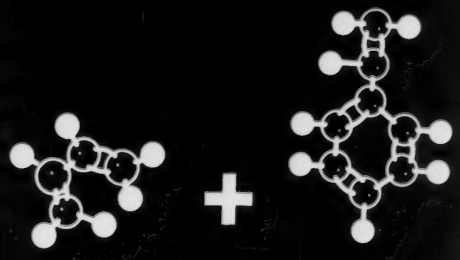
Mr. Lehmann joined the company in 1940 as a time study man. After experience in that field in the Aeronautical, Industrial Products and Tire Divisions, he was named process engineer in the tire company in 1946. A year later, he was appointed manager of industrial engineering in the tire company and in 1948, he was named production superintendent of the Oaks, Penna., tire plant. Mr. Lehmann became staff superintendent of the tire company in 1951 and five years later, he was appointed tire plant superintendent.

Builds New Plastics Laboratory

► Geigy Industrial Chemicals, division of Geigy Chemical Corp., has announced that the company is adding a plastics laboratory to its Ardsley, N. Y., headquarters, due to an increased interest in stabilizers for plastics. Geigy is distributing experimental quantities of a new ultraviolet absorber "CH3457," designed to protect plastics and other organic materials against the destructive effects of ultraviolet radiation. According to Geigy, stabilizers of this type which have been available to date, have been hydroxybenzophenone derivatives. "Ch3457," reported to be a benzotriazole derivative, was developed by the company's Swiss researchers. The new material is colorless at use concentrations, cuts off radiation sharply below 3900 Angstrom units and has noteworthy heat stability and low toxicity, Geigy claims.

Rubarite Distributors Named

► The Chemical Division of the Goodyear Tire & Rubber Co., Akron, Ohio, has announced the appointment of three distributors for "Rubarite", the company's coprecipitate of synthetic rubber and a mica-type carrier which finds use in road surfacing applications. Accounts in New Jersey, metropolitan New York and western Pennsylvania will now be serviced by the Borne Chemical Co. of Elizabeth, N. J. Flesch-Miller Co., Indianapolis, Ind., has been named to handle accounts in the state of Indiana, while Servicized Products, Inc., Chicago, Ill., will service the remaining states.



SYNPOL

SYNPOL
TEXUS
TEXAS-U.S. CHEMICAL COMPANY
PORT NECHES, TEXAS
TEXUS

In a Buyers' Market, when the consumer elects to pick and choose, "minute" product differences or advantages count for little. To meet this challenge, manufacturers of consumer products must constantly evaluate *real* market needs; satisfying the pressing demands for *significant* product improvement and innovation—with processing economies.

The recent development of oil-extended, light-colored butadiene-styrene rubbers met the dual need of the rubber fabricator for light and bright colors *with economy*. A substantial contribution toward this dramatic improvement was the development and use by Texas-U. S. Chemical Company of a highly refined, non-volatile, pale naphthenic oil in TEXUS SYNPOLS. This development of light-colored polymers has been the most important of a number of advances in polymer technology since private industry's take-over of Government rubber-producing facilities.

Important and expanding TEXUS research programs will *continue* to offer significant polymer improvements benefiting the fabricators, compounders, designers and engineers of the rubber industry. In 1958, at least three completely new rubbers will be introduced, by TEXUS, promising new processing economies and product improvements for you.

This is a Promise in Action... from TEXUS.

TEXUS SYNPOL®

TEXAS-U. S. CHEMICAL COMPANY
260 Madison Avenue, New York 16, N. Y.

"A" to "Z"

As a basic fabricating material, butadiene-styrene rubbers now find application in the manufacture of an almost incalculable number of products. For through the magic of chemistry it is possible to "custom tailor" polymers to the product needs of manufacturers, thus freeing the compounders (and designers and engineers) from the limitations long imposed by natural rubber.

In TEXUS SYNPOLS, desired characteristics have been "built in"—abrasion resistance for additional "mileage"; tensile and tear strength for increased "durability"; oil extension and ability to highly load, for greater "economy"; plus other inherent product characteristics enabling faster processing, smoother surfaces, more brilliant colors.

The present line of TEXUS SYNPOLS offers product manufacturers the widest selection of the best clear polymers in the industry; and also the many specific technical advantages needed to meet the various individual requirements of an ever increasing number of products.

For your rubber needs... technical service, compounding and processing aid, technical literature, or quick delivery of a bale, truckload, carload or shipload of one of the seventeen available grades of SYNPOL... *turn to TEXUS.*

TEXUS SYNPOL®

TEXAS-U. S. CHEMICAL COMPANY

260 Madison Avenue, New York 16, N. Y.

TEXUS

SYNPOL

Butadiene-Styrene Synthetic Rubbers

SYNPOL	HOT TYPES						
	1000	1001	1002	1006	1007	1009	1012
DESCRIPTION							
Emulsifier	Fatty Acid	Fatty Acid	Rosin Acid	Fatty Acid	Fatty Acid	Fatty Acid	Fatty Acid
Stabilizer	Staining	Slightly Staining	Staining	Non-Staining	Staining	Non-Staining	Non-Staining
Miscellaneous				Non-Discoloring	Glue Acid coagulated	Non-Discoloring Divinylbenzene Terpolymer	Non-Discoloring
SPECIFICATIONS							
CHEMICAL							
Volatile Matter (Max.)	0.50	0.50	0.50	0.50	0.50	0.75	0.50
Ash (Max.)	1.50	1.50	1.50	1.50	0.50	1.50	1.50
Organic Acid	4.00–6.25	4.00–6.25	3.75–6.00	3.75–6.00	3.75–6.00	3.75–6.00	4.25–6.50
Soap (Max.)	0.75	0.75	0.75	0.75	0.25	0.75	0.50
Bound Styrene	22.5–24.5	22.5–24.5	22.5–24.5	22.5–24.5	22.5–24.5	22.5–24.5	22.5–24.5
Stabilizer	1.00–1.75	1.00–1.75	1.00–1.75	1.25 added	1.00–1.75	1.25 added	1.25 added
PHYSICAL							
Raw Viscosity	44–52	44–52	50–58	46–54	45–55		95–115
Cpd. Viscosity (Max.)	73	73	65	73	73	115–135	120
Tensile psi (Min.)	2700	2500	2700	2500	2400	1600	2900
Elongation % (Min.)	550	500	550	500	500	300	450
#Modulus psi 25'	300–600	325–625	300–600	400–700	450–750	400–700**	550–1000
#Modulus psi 50'	800–1150	750–1100	750–1100	825–1175	775–1125	600–950**	1200–1700
#Modulus psi 100'	1250–1650	1200–1600	1125–1525	1300–1700	1125–1525	850–1250**	1750–2250
Water Soluble Ash % (Max.)					0.35		
Water Absorption mg./sq. cm. (Max.)					1.50		
Mill Shrinkage % (Max.)						25.0	
Oil—Parts							
Oil—Type							
REMARKS	A general purpose hot rubber adaptable to most black products where color is unimportant.	More resistant to staining and discoloring than 1002.	Higher tensile and lower modulus in cured compounds than 1000 or 1001. Slower curing.	General purpose, non-discoloring and non-staining polymer.	Glue acid coagulated staining polymer with relatively low water absorption, low ash, and good electrical properties.	A non-staining cross linked polymer. Use of small quantities with other type polymers reduces shrinkage and die-swell in calender and extrusion operations.	A high-Mooney polymer for solution applications.
APPLICATIONS	Tires, molded and extruded mechanical goods, shoe soles and heels, and any other general purpose application.	Tires, molded and extruded mechanical goods, shoe soles & heels.	Tires, molded and extruded mechanical goods.	Light-colored and white products, such as white sidewall tires, shoe soles, floor tile, toys, hospital sheeting and sporting goods.	Wire and cable insulation, electrical tape, gaskets, hard rubber products, etc.	Where control of shrinkage is important. Footwear, wire & cable insulations, calendered goods, soles, heels. Can be used with Natural Rubber and Neoprene.	Asbestos sheet packing. Special types of adhesives and certain mechanical goods.

†Based on rubber content #300% Elongation **Synpol 1009 Moduli @ 200% Elongation

SYNPOL, Texas-U. S. Chemical Company's trade name for butadiene-styrene copolymers, has earned the highest reputation for quality and uniformity.

TEXUS SYNPOLS, with numbers corresponding to earlier types of GR-S, are manufactured to conform to the former specifications, though many improvements in color, uniformity, economy, and performance have been made. Those SYNPOLS incorporating advances in polymer technology that produce entirely new types, or that alter end-product specifications, are designated by new numbers.

There are seventeen grades of SYNPOL... polymers to meet the most exacting requirements of many products and processes. Thus, SYNPOL users benefit from the economy of mixed truckload combinations—and also a variety of packages to provide maximum handling efficiency and flexibility in their plants.

Technical advantages of various SYNPOLS include:

High Physicals · Light and Bright Colors with Economy

Low Water Absorption at No Premium · Controlled Die Swell

Ease of Processing · Lower Processing Times · Power Savings

Reduced Shrinkage · Lower Banding Times

Controlled and Uniform "Blow"

TEXUS Technical Data Bulletins contain comprehensive data on all SYNPOLS and examples of how these advantages may benefit your products. These Bulletins are immediately available through your local TEXUS Representative or Naugatuck Chemical, Naugatuck, Connecticut—SYNPOL Sales Agent.

For your rubber needs... Specify SYNPOL.

		COLD TYPES			COLD OIL-EXTENDED TYPES				
1013	1061	1500	1502	1551	1703*	1707*	1708*	1711	1712
Fatty Acid Non-Staining Non-Discoloring Alum Coagulated High styrene	Fatty Acid Non-Staining Non-Discoloring	Rosin Acid Staining	Mixed Soap Non-Staining Non-Discoloring	Rosin Acid Non-Staining Non-Discoloring	Mixed Soap Non-Staining Non-Discoloring	Rosin Acid Non-Staining Non-Discoloring	Fatty Acid Non-Staining Non-Discoloring	Rosin Acid Staining	Mixed Soap Staining
1.00 1.25 4.00—6.00 0.01 42.0—44.0 1.25 added	0.50 1.50 4.00—6.25 0.75 22.5—24.5 1.25 added	0.75 1.50 5.00—7.25 0.50 22.5—24.5 1.00—1.75	0.75 1.50 4.75—7.00 0.50 22.5—24.5 1.25 added	0.75 1.50 5.00—7.25 0.50 22.5—24.5 1.25 added	0.75 1.50 4.50—6.30 0.50 22.5—24.5 1.25 added†	0.75 1.50 3.90—5.70 0.50 22.5—24.5 1.25 added†	0.75 0.50 3.90—5.70 0.50 22.5—24.5 1.25 added†	0.75 1.50 3.90—5.70 0.50 22.5—24.5 1.25 added†	0.75 1.50 3.90—5.70 0.50 22.5—24.5 1.25 added†
40—50 73 2500 600 350—750 775—1175 1250—1750	44—52 73 2500 500 325—625 750—1100 1200—1600	46—58 73 3800 600 300—650 800—1200 1200—1700	46—58 73 3100 575 350—650 775—1125 1250—1650	46—58 73 3600 600 300—650 800—1200 1200—1700	50—70 25 Naphthenic	45—65 37.5 Naphthenic	50—70 0.35 1.50 37.5 Naphthenic	45—65 37.5 Highly Aromatic	45—65 37.5 Highly Aromatic
A high styrene, non-staining and non-discoloring polymer.	Similar to 1006, with Polygard stabilizer.	A general purpose cold rubber for use where color and staining is unimportant.	Non-discoloring and non-staining cold rubber. Higher physicals than 1006 and 1061.	A general purpose non-staining and non-discoloring cold rubber, based on recipe for 1500.	A general purpose non-discoloring, non-staining oil-extended polymer.	Similar to 1703. Emulsified with rosin soap rather than mixed soap.	Non-discoloring and non-staining polymer, low ash content and water absorption values, resulting in good electrical properties.	Similar to 1712, emulsified with rosin soap rather than mixed soap.	General purpose oil-extended polymer for use where color and staining is unimportant.
Calendered goods, closures, can sealants, adhesives and molded goods.	Light-colored and white products such as white sidewall tires, shoe soles, floor tile, toys, hospital sheeting and sporting goods.	Tires, camelback, molded and extruded mechanical goods.	Light-colored and white products such as white sidewalls, white and light colored mechanicals, floor tile, hospital sheeting, toys, soles, heels, food conveyor belts.	For general use where non-staining characteristics are important.	Light-colored and white products; tires, mechanical goods, floor tile, shoe soles and heels, sporting goods and toys.	White sidewall tires, camelback, molded and extruded mechanical goods. Friction and skim coats. Molded shoe soles and heels.	Wire and cable insulation; certain electrical goods, coated fabrics, molded and extruded mechanicals, soles and heels, wringer rolls, floor tiles.	Tires and camelback. Molded and extruded mechanical goods.	Tires, camelback, molded and extruded mechanical goods. Wire and cable insulation.

*New improved light-colored, oil-extended polymers

TEXUS
TECHNICAL DATA
TEX US
TEXAS-U.S. CHEMICAL COMPANY

Technical Service

Extensive Technical Service is conducted by TEXUS to assist on a diversity of customer problems. Many of these have been solved by full utilization of SYNPOL's quality and versatility.

A highly trained TEXUS Team of chemists and engineers is ready to aid you in the development of new products and processes. Fabrication and processing specialists are also available for "On-the-Job" consultation.

Technical Data Bulletins on each polymer type are currently available. The most comprehensive of their type, they offer numerous cost-tested compounding formulas to permit the maximum number of SYNPOL's desirable characteristics to be incorporated in each of your products.

In addition, to enable you to maintain a complete file of SYNPOL data, an attractive, well-indexed ring binder has been prepared. To obtain this up-to-date information, and to insure receiving the latest processing technology as it is compiled, contact the TEXUS Representative in your area or Naugatuck Chemical, Naugatuck, Connecticut—SYNPOL Sales Agent.

You can count on TEXUS for . . . Complete Technical Service.

TEXUS SYNPOL®

TEXAS-U. S. CHEMICAL COMPANY
260 Madison Avenue, New York 16, N. Y.

Research and Product Control

From the research laboratories will come the new ideas, the new discoveries, the new technologies that lead to improved products...*and* the practical assistance needed for their successful commercial development.

To effectively serve rubber fabricators, TEXUS employs organic, analytical and physical chemists and engineers on extensive research in three major areas:

BASIC RESEARCH—the exploration of theoretical aspects of polymerization and chemical reactions to search out completely new polymers.

POLYMER RESEARCH—the continuing improvement of present products, the development of new rubbers and the search for ways these can benefit industry.

ENGINEERING RESEARCH—the instrumentation and automation of plant processes to obtain maximum uniformity and product purity and development of equipment to produce rubber in the most easily usable forms and packages.

A specific example of customer benefits resulting from engineering development has come from installation over a year ago of all-stainless-steel equipment in the TEXUS Port Neches plant, at every critical processing stage.

This innovation in processing equipment, in combination with other product controls, assures the highest degree of purity and complete freedom from "tramp contamination" in all TEXUS SYNPOLS. This is particularly essential to rubber fabricators interested in efficient use of every pound of rubber purchased, through elimination of waste and spoilage.

You can count on TEXUS for... Research Results.

TEXUS SYNPOL®

TEXUS and SYNPOL are registered trademarks of the Texas-U.S. Chemical Co.

TEXAS-U. S. CHEMICAL COMPANY
260 Madison Avenue, New York 16, N. Y.

Sales, Service and Supply

In rubber compounding, processing and product application, SYNPOL users are well served by experienced TEXUS Technical Sales Representatives. These men have the technical backgrounds which are a **must** for prompt and effective customer service. Supplementing this experience, TEXUS also offers the "In-Plant" service of a variety of Technical Specialists, whenever and wherever they can be of aid in solving processing problems.

In addition, TEXUS provides the most extensive warehousing operation in the synthetic rubber industry. Each SYNPOL warehouse – there are six strategically located throughout the country – offers economies through such outstanding features as: overnight delivery; lower on-hand inventory; lower in-transit inventory; mixed truckload combinations; and emergency shipments to help you maintain production schedules.

If you are considering a new product or improving a present one... if you need chemical or engineering assistance with fabrication... if you are interested in the latest developments in the packaging of synthetic rubber... or if you would just like to receive the TEXUS Technical Data Bulletins, contact the TEXUS Representative in your area or Naugatuck Chemical, Naugatuck, Connecticut – Sales Agent for TEXUS SYNPOL.

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Printed in U.S

Boltathene Polyethylene Resin

► A new high density, low cost polyethylene material that can withstand temperatures up to 240°F. has been introduced by Bolta Products, Lawrence, Mass., division of the General Tire & Rubber Co. Said to have potential uses in many diversified fields, the new product, trademarked "Boltathene," is available in sheets up to 70 inches wide and in thicknesses from six gauge to 70 gauge. Fabrication costs are reported nominal inasmuch as the material is readily adaptable to low cost molds. Unlike conventional low density polyethylene, the new high density material is said to withstand temperature extremes without change. It is claimed not to lose its shape when placed in contact with boiling water, a fact that makes it useable as a container for hot liquids. Boltathene will not crack, shatter or become brittle at low temperatures, making it ideally suited to such fields as packaging frozen foods. Spokesmen said the food could be sterilized right in a container and then placed in deep-freeze storage. Properties of heat and cold resistance also give the material potential useage in various items for hospitals, infant care and similar applications where sterilization is required, it was noted.

Houdry Licenses Japanese Firm

► Japanese Synthetic Rubber Co., Ltd., has been licensed by the Houdry Process Corp., Philadelphia, Penna., to construct a Houdry Dehydrogenation Process unit for butadiene production as a part of an integrated synthetic rubber plant to be built in the Yokkaichi vicinity. Organized recently, the new company will utilize the Houdry unit to produce 25,000 short tons of butadiene annually, which when supplemented by other butadiene sources will produce 45,000 metric tons of synthetic rubber per year. Varying feedstocks will be charged to the new Japanese dehydrogenation unit, including refinery butanes and butane-butene mixtures from petrochemical plants. Engineering design for the dehydrogenation unit is being furnished by Houdry. It is estimated that the new synthetic rubber plant at Yokkaichi will come on stream during 1960. The Japanese unit is the third foreign dehydrogenation plant to be licensed by Houdry.

Thixon Primer P-3

► Harwick Standard Chemical Co., Akron, Ohio, has announced the availability of "Thixon Primer P-3," a new primer for bonding natural rubber, styrene rubber, neoprene and butyl stocks to metals. Manufactured by Dayton Chemical Products Laboratories, Inc., the product is a special compound of chemical derivatives in volatile solvent. Green in color, it has a solvent odor and is nontoxic in ordinary handling. It has a typical specific gravity of 1.1 at 25°C. and there are 9.2 pounds per gallon. Thixon Primer P-3 is supplied in brushing consistency and may be diluted with xylol. With certain stocks, Thixon Primer P-3 will function as a one coat bonding agent. In others, it is used with an appropriate secondary cement.

R. E. Dyer

Named Special Representative

► Appointment of R. E. Dyer as special representative has been announced by the Chemical Division of the Goodyear Tire & Rubber Co., Akron, Ohio. With headquarters in Cleveland, Mr. Dyer will provide sales and technical service to accounts in the mid-central states. Mr. Dyer joined Goodyear in 1954 and served on the company's training squad for six months before entering the Army. He returned early in 1957 and was assigned to the Chemical Division where he has been training in preparation for a field assignment. He is a graduate of the University of Toledo with a degree in chemical engineering and is an active member of the American Chemical Society.

Promoted by Electric Auto-Lite

► Electric Auto-Lite Co., Toledo, Ohio, has announced the appointment of Robert A. Barker to the new post of manager of engineering for the Wire and Cable Division and has named Fred Wetzel as engineering consultant for the Division, until his retirement on April 30, 1958. Prior to this assignment, Mr. Wetzel, who completed 40 years of service with Auto-Lite in December, was chief engineer for the Division. Mr. Barker, who started with Auto-Lite in 1942, will direct the activities at the wire and cable research laboratory at Port Huron. He will also be in charge of advancement of present product engineering and production methods and expansion of the division's product lines. Mr. Barker completed engineering work in electronics at Port Huron Junior College and Wayne University.

Named Sales Representative

► Joseph H. Ward has been appointed a sales representative in the Industrial Chemicals Division of Pittsburgh Coke & Chemical Company. He will handle sales of the company's industrial chemicals in the New York territory of Brooklyn, Long Island, and Upper New York State. Mr. Ward joined the firm in 1954, and prior to his promotion had been assigned to the Division's Product Development Section.

Snell Buys Davis & Bennett

► Foster D. Snell, Inc., New York, N. Y., has announced the acquisition of Davis & Bennett, Inc., Worceser, Mass., the fifth major expansion for the Snell organization within recent years. Davis & Bennett is a 35 year old organization of consulting chemists, chemical engineers and biologists, while the New York organization consists of consulting chemists and chemical engineers. Benjamin Seibel, of Snell, has been named laboratory director of the new division. Mr. Seibel is a graduate of the City College of New York and has completed graduate courses in high polymers and textiles. He has experience in polymers and textiles, has worked extensively on problems in chemistry and physics with Snell, has been responsible for research and development and evaluation of paper and fibrous materials, and has done work in the field of light microscopy and its various applications. Mr. Seibel has also become well known as a technical witness in litigation and in the preparation of specifications. Before he joined Snell, Mr. Seibel was a chemist in charge of laboratory in a department store Bureau of Standards.

Goodyear Tire Promotes Two

► Goodyear Tire & Rubber Co., Akron, Ohio, has announced two personnel changes in the Tire Development Division. Joseph F. Hutchinson has been named assistant development manager of Tire Divisions, and Willis S. Zeigler, was appointed manager of automotive engineering for the division. A graduate of Georgia Tech, Mr. Hutchinson joined Goodyear as a member of the production squad in 1946. He was awarded a Sloan Fellowship at Massachusetts Institute of Technology in 1949, to study management, economic, and social problems of industrial administration. Mr. Zeigler, formerly resident engineer for the company in Detroit, graduated from Cornell University and began his career with Goodyear in 1947, as a member of the production squadron.

Named Marketing Vice-President

► Landers Corp., Toledo, Ohio, has announced that Charles M. Scholz, general sales manager, has been elected vice-president for marketing. Mr. Scholz spent fifteen years in the rubber and plastics field before he joined Landers in 1957, most recently as vice-president and general manager of the Rubber Division of the Thermoid Co. A graduate of Cornell University where he majored in chemistry, he served with the United States Navy during World War II and the Korean Conflict. Mr. Scholz is a member of the Cornell Club of New York, the American Marketing Association and Sigma Nu Fraternity.

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Financial News

Farrel-Birmingham

► For 1957: Net income of $2,378,112, which is equal to $7.43 a share, compared with $985,481, or $3.08 a share, a year earlier. Net sales in 1957 totaled a record high of $50,868,485, compared with $50,238,519 in 1956. The company reported that the backlog on December 31 was $25,000,000 compared with $36,500,000 at the same time in the previous year. Total current assets at year's end amounted to $22,381,986, compared with $26,721,677 the year before, and total current liabilities were $7,685,987 compared with the 1956 figure of $13,604,591. In the president's message to the stockholders, Franklin Farrel, 3rd, stated that it was clear from the trend of new orders that lower shipments and reduced net earnings must be expected in 1958.

Hewitt-Robins

► For 1957: Net income of $1,397,542, which is equal to $3.43 per common share, compared with $1,362,175, or $3.35 per share in 1956. Sales last year were $57,327,072, compared with $55,454,245, the year before. The company states that the inclusion for the first time of sales of Hewitt's wholly-owned Canadian subsidiary accounted for most but not all of the increase. Cash on hand at the end of the year amounted to $3,684,154, compared with $1,860,749 at the end of 1956 and net working capital increased from $15,453,577 to $16,270,483.

Diamond Alkali

► For 1957: Net income of $7,035,000, which is equal to $2.53 per share, compared with $10,380,000, or $3.73 per share, in the preceding year. Sales in 1957 continued their upward trend totaling $122,640,000, compared with $121,260,000, in 1956. According to the company, income in 1957 reflects losses related to Black Leaf Products amounting to $905,000, or 32c per share, and a non-recurring charge in the amount of $150,000 or 5c per share resulting from the adoption of the LIFO method of pricing finished goods inventories.

DeVilbiss

► For 1957: Net income of $1,556,957, which is equal to $4.26 per common share, compared with $1,790,625, or $4.98 a share, the year before. Sales in 1957 totaled $26,000,116 compared with $22,651,278 in 1956.

Mansfield Tire

► For 1957: Net income of $1,522,957, which is equal to $2.50 per share, compared with $1,376,683, or $2.23 a share in the preceding year. Sales in 1957 totaled $59,722,211 compared with $61,557,595 in 1956.

General Cable

► For 1957: Net income of $11,099,167, or $3.80 per common share, compared with $12,027,428, or $4.21 a share, in the preceding year. Sales in 1957 totaled $172,757,543 compared with $186,645,106, the year before. There were 2,815,778 shares outstanding at the end of 1957 and 2,758,802 outstanding a year earlier. According to the company though sales and earnings were lower last year than in 1956, they represented the second best year in the company's history.

Mohawk Rubber

► For 1957: Net income of $563,180, which is equal to $3.90 per share, compared with $370,525, or $2.62 a share, in 1956. Sales in 1957 rose 38 per cent to $20,842,426, compared with $15,126,701 in the preceding year. The company again paid a $1 dividend, but added a 2 per cent stock dividend last year which was equivalent to 44c a share based on February's prices. Mohawk expects a 20 per cent sales gain in 1958 and a comparable improvement in profit.

Columbian Carbon

► For 1957: Net income of $4,253,119, which is equal to $2.64 per share, compared with $4,834,356, or $3.00 a share, in 1956. Sales last year totaled $71,276,168 compared with $65,909,033 in the preceding year.

Brunswick-Balke-Collender

► For 1957: Net income of $6,886,748, which is equal to $5.53 a share, compared with $3,364,390, or $2.93 a share, in the preceding year. Sales in 1957 totaled $122,605,707, more than double the 1956 total of $51,437,258.

Okonite

► For 1957: Net income of $109,694, which is equal to 51c a share, compared with $1,675,125, or $8.21 a share, the year before. Sales in 1957 totaled $40,686,000 compared with $53,226,000 in the preceding year.

U. B. S. Chemical

► For 1957: Record net income of $303,042, which is equal to $1.92 per common share, compared with $107,530, or 83c a share, in 1956. Sales in 1957 totaled $5,194,930 compared with $3,424,047 the year before.

Sheller Manufacturing

► For 1957: Net income of $2,050,558, which is equal to $2.15 per share, compared with $1,271,606, or $1.33 a share, the year before. Sales in 1957 totaled $42,139,499 compared with $41,071,196 in 1956.

Goodrich 1957 Sales Rise As Earnings Decline 10%

► B. F. Goodrich Co., Akron, Ohio, has reported a decrease in profits of 10.0 per cent during 1957 although sales increased by 1.4 per cent. Net income in 1957 was $39,369,705, which is equal to $4.40 per common share, compared with $43,765,431, or $4.90 in 1956. Dividends received from associate companies (not consolidated) in which Goodrich owns less than majority interest are included in the consolidated net income. Increases in Goodrich equity in net income retained by associate companies, amounting to $4,035,000 for the year 1957 and $3,947,000 for the year 1956, have not been included in the organization's consolidated net income.

The company's net sales in 1957 amounted to $734,650,802, compared with $724,168,401 in 1956. Direct and indirect sales to the Federal government were 5.9 per cent of the total net sales for the year 1957 compared with 5.4 per cent for the year 1956.

According to Goodrich, lower income in 1957 was due to higher employment and freight costs and a strike of fifteen days duration in nine of the company's rubber products plants. A sharp decline in sales during the months of November and December resulted in materially lower earnings in the fourth quarter compared to those of the previous year.

Dividends totaled $2.20 a share in each of the years, 1957 and 1956. Total dividend payments to stockholders were $19,684,849 in 1957 and $19,604,157 in 1956. Federal and foreign income taxes for the year 1957 were $36,544,000 compared with $43,082,000 in 1956. All taxes, including excise and other taxes, amounted to approximately $87,189,000 in 1957, equivalent to $9.74 a share, compared with $86,846,000 in 1956, equal to $9.72 a share. Depreciation and amortization of leasehold improvements in 1957 amounted to $21,133,262 compared with $19,468,957 in 1956.

Expansion Program Cited

Capital expenditures and investments during 1957 for the modernization and expansion of manufacturing, distribution, and research facilities of The B. F. Goodrich Co. amounted to $38,871,000. Capital expenditures and investments during 1956 were $37,006,000. Current assets at the end of 1957 were $333,262,772 and current liabilities were $89,336,849, a ratio of 3.7 to 1. Net working capital was $243,925,923 at year end compared with $245,143,065 at the end of 1956. The ratio of net working capital to bonds and notes payable after one year was 5.3 to 1 at the end of 1957 compared with 5.2 to 1 at the end of 1956.

Inventories at year end amounted to $168,725,391 compared with $147,258,710 at the end of 1956. Domestic inventories of man-made and natural rubber and rubber-like materials have been priced on the last-in, first-out (LIFO) basis in both years. Other inventories have been priced at the lower of cost or market.

To Translate Russian Journal

► A leading Russian technical magazine, *Journal of Applied Mathematics and Mechanics*, will soon be translated into English on a regular basis by the American Society of Mechanical Engineers. Under a $35,000 grant from the National Science Foundation, ASME will publish the bimonthly journal, known in the Russian language as *Prikladnaya Matematika i Mekhanika* and usually abbreviated as "PMM." The Society has undertaken the task of translation as an attempt to correct the present situation in which the Russians are familiar with the content of most of our technical publications, while only a few of theirs are translated for use by the English-speaking world. Arrangements have been made with Russian scientists to secure proof sheets of the Russian journal in advance of final printing, to permit speedier translation. The magazine contains the latest theoretical and practical advances made by Russian scientists, in mathematics, fluid dynamics and solid state physics. Copies will be sold, on a subscription basis, to any interested persons or groups at an annual rate of $35 for the six issues. Subscriptions may be entered through the Order Department, American Society of Mechanical Engineers, 29 West 39th St., New York 18, N. Y.

RTV Compounds For Aircraft

► Silicone Products Department of the General Electric Co., Waterford, N. Y., has developed what are said to be the first silicone rubber room temperature vulcanizing (RTV) compounds designed to meet the special needs of the aircraft industry. The new compounds may be poured or spread in place in a number of caulking, sealing, patching, encapsulating and potting applications. Designated "81774" and "18113", the RTV compounds do not require the heat cure ordinarily used for silicone rubber and they possess much of the long term heat resistance and low temperature flexibility unique to silicone rubber, the company says. In addition, they exhibit the outstanding resistance to ozone, weathering and aging which is characteristic of silicone rubber.

Soviet Building Tire Factory

► A Soviet trade mission has announced that Russia has placed an order in Great Britain for tire factory equipment amounting to a value of 10 to 15 million pounds ($28 to $42 million). Said to be one of the largest orders placed by the country, the equipment will be utilized in the construction of a factory to be built at Dniepropetrovsk in the Ukraine. It is believed that this will be the largest tire plant outside the United States, with a productive capacity of 2 million tires a year. The order for equipment was placed with Rustyfa, a group of British companies.

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Floyd B. T. Myhre

Named Assistant to President

► Capt. Floyd B. T. Myhre has been appointed assistant to the president in charge of the Washington office of Witco Chemical Co., New York, N. Y. Capt. Myhre will serve as Washington representative for Witco and all its divisions including the Ultra Chemical Works, and the Emulsol Chemical Corp. His previous associations include service with the National Security Industrial Association and as Washington representative for various American concerns. An Annapolis graduate, Capt. Myhre is a past commander of the American Legion and a member of the American Ordnance Association, the Air Force Association, the Society of Military Engineers, and the Navy League. He is also associated with the Armed Forces Chemical Association and the American Chemical Society.

Bolling Receives Patent Grant

► Stewart Bolling, Cleveland, Ohio, has been granted U.S. Patent No. 2,820,618 for an arrangement of driving rotors of intensive mixers independently, which is said to eliminate connecting or differential gears and to make front and back rotors interchangeable. The time cycle of plasticizing or fluxing of rubber and plastics, and even and fast dispersing of fillers and pigments, can be materially decreased by an increase in rotor speed and chamber pressure. Power increase is proportional, and due to limited centers of rotors, connecting gears have, with the four-fold or more increases in power, already passed their practical limits, according to the company.

Kerstein Named Sales Manager

► Blane Corp., Canton, Mass., has announced the appointment of Gerald Kerstein as sales manager of the Compound and Color Concentrate Divisions. Mr. Kerstein, formerly associated with the Niles State Envelope Co. as sales manager, joined Blane three years ago. He served in the European Theatre of operations with the U. S. Air Force during World War II and is a graduate of the University of Vermont.

Plan Skid Prevention Conference

► University of Virginia, Charlottesville, Va., has announced that an International Skid Prevention Conference, to be attended by engineers and other scientists will be held in September at Charlottesville, to organize a coordinated program of research on the problem of traction between the vehicle and the road. Tilton E. Shelburne, director of the Virginia Council of Highway Investigation and Research is chairman of a Conference Steering Committee, which is composed of representatives of government, industry and research agencies.

Technical men throughout the world have been requested to communicate with Mr. Shelburne at the University of Virginia if they have research findings which could be of value to the Conference. The primary aim of the Skid Conference is to exchange and correlate, on a world wide basis, technical information on all aspects of the skidding problem. The Conference program will provide a forum for discussion of vehicle dynamics, the influence of the tire, the effect of the driver and the effect of the road surface on traction. Studies will also be made of the accuracy of skidding accident statistics and of various methods now used to test road surface friction.

Mohawk Rubber Promotes Three

► Three promotions in its technical staff have been announced by the Mohawk Rubber Co., Akron, Ohio. Robert M. Hill has been named manager of compounding and processing development and will be in charge of all phases of process development in addition to his present duties that include responsibility for tire compounding. Mr. Hill joined Mohawk in 1957 as manager of tire compounding. Frank M. Johnson has been appointed chief chemist of the Akron plant, where he will be concerned with the over-all technical problems of the plant. Mr. Johnson has been with the company since 1954 during which time he has worked in various phases of development. Ronald M. Schoonover has been transferred to the company's Helena, Ark., plant where he will serve as manager of technical service.

Introduces Four Niax Triols

► Union Carbide Chemicals Co., New York, N. Y., has introduced a new series of polyol polyethers to be used in the manufacture of flexible urethane foams. The new intermediates are propylene oxide addition products of 1,2,6-hexanetriol, trade-marked "Niax". Four polyethers, varying in hydroxyl number from 42 to 240 and corresponding to molecular weights from 4000 to 700, are available. These are Niax triols LHT-42, LHT-67, LHT-112 and LHT-240. Niax triols can be used alone or in combinations with a polypropylene glycol such as Niax diol PPG-2025. Greater proportions of the triols increase the load-bearing properties and improve the compression-set characteristics of urethane foams, the company states.

Cabot Commemorates 75th Anniversary

CABOT

In its 75th year of carbon black production, Cabot's history is a reflection of the massive steps forward taken by American industry

One of the first companies to produce blacks, Cabot has diversified into many fields.

► Godfrey L. Cabot, Inc., parent company of the Cabot organization, is celebrating its 75th year as a producer of carbon black. One of the oldest and largest carbon black producers in the world, Cabot has plants in Southwestern United States, Canada, England and France and plans to build another in Australia. The company has also diversified into allied and other fields which require similar skills.

Cabot was founded in 1882 by Godfrey L. Cabot, with his older brother Samuel, at Buffalo Mills, Penna. The black, which they made by burning natural gas from Pennsylvania oil fields, was used almost exclusively in the paint and ink industries as a pigment, selling for about 35c a pound. In 1887, Mr. Cabot bought out his brother's interest and started his own firm. The industry had, at this point, become quite competitive. There was an adequate supply of the pigment which now sold at five cents a pound.

Though many firms were throttled by sharp competition, Cabot continued to expand.

At a time when competition, increasing prices and diminishing gas supplies resulted in failure for many carbon black producers, Mr. Cabot was expanding his operations. By 1900, he had acquired four plants in Pennsylvania and one at Dunkirk, Ind., and had also leased property and drilled a number of gas wells in Pennsylvania.

With the development of new oil and gas fields in West Virginia, Mr. Cabot took leases and bought mineral rights in several counties. His first well in that state, completed in the autumn of 1899, still produces gas today. The Grantsville carbon black plant was completed in 1900 and was the largest carbon black plant in the world.

Mr. Cabot bought the West Virginia Carbon Company's plant near the Grantsville plant in 1913. Then, interested in the use of liquefied gas for cutting and welding steel, he organized the Liquid Fuel Co. Compressed natural gas proved to be unsatisfactory in this application and the operation was later discontinued.

Gas had since been discovered in Louisiana and, in 1917, part of the Sunset plant was shipped to Howard, La., where it was operated for about a year. Cabot started operations in Boone County, West Va., in 1919 and within the next few years, properties in Harrison County, West Va., were purchased, including oil and gas properties and operations, a carbon black plant and a gasoline plant.

Discovery of gas in Louisiana was the beginning of the firm's move from the East.

Operations were incorporated under the name "Godfrey L. Cabot, Inc.", in 1922. Depletion of fields in Pennsylvania resulted in the sale of properties in that area and the company

Completed in 1900, Cabot's Grantsville, West Va., plant was then the largest carbon black plant in the world.

expanded its domestic sales into Boone County. New gas supplies were needed and in 1925, the industry was moved into the Southwest. Carbon black plants in the East were shut down and headquarters were established at Breckenridge, Texas. Carbon black plants at Eliasville and Caddo, Texas, were completed in 1926, and construction of the Schafer plant at Skellytown got underway. Southwestern headquarters were moved to Pampa, Texas, in 1927.

Increased need for new gas sources lead to the opening of new plants in the Southwest.

At this time, Cabot Carbon Co. was formed and is now the organization's sole carbon black producer in the United States.

Within the next two years, Cabot Carbon Co. built two gasoline plants and the Wickett and Kermit carbon black plants in West Texas. Later, the company bought a third carbon black plant in the same area.

Cabot's first furnace black plant was built at Guymon, Okla., and construction was started on another at Ville Platte, La., in 1943. In 1945, a channel black plant was built for the government at Guymon. After operating this government owned facility for two years, Cabot bought the plant.

Cabot's first unit for the production of furnace black was followed by several others.

General Atlas Carbon Co., consisting of two furnace black plants, was purchased in 1946, and in 1949, the Dixon plant was moved from Guymon, Okla., to Big Spring, Texas.

The company began to move its operations into Europe in 1948 when it formed Cabot Carbon, Ltd., and constructed a plant at Stanlow, Ellesmere Port, England. A channel black plant near Hobbs, New Mexico, was purchased from the government that year and shut down in 1954, when the demand for channel black fell.

Cabot's first carbon black plant in the Southwest, the Eliasville, Texas, channel black plant was completed in 1926.

The need for new facilities increased steadily and Cabot Engineering Co. was formed in 1951 to design and construct Cabot plants. Construction of a carbon black plant at Franklin, La., called the Canal plant, was started. Cabot Carbon of Canada, Ltd., was also formed then and a new plant was built at Sarnia, Ont., Canada.

As research became more vital to the firm's operations, new laboratories were constructed.

Research and development had become vital factors in Cabot growth and in 1951, the company built new laboratories at Cambridge, Mass. The firm had also become interested in the high temperature carbonizing of carbonaceous material and joined two other companies to form Petrocarb Equipment Co. Also in 1951, a Wollastonite mine at Willsboro, N. Y., was purchased.

Cabot France, S. A., was formed in 1955 and a plant at Berre L'Etang, France, will be in operation soon. Franks Manufacturing Corp. was also purchased then by Cabot Shops and moved from Tulsa, Okla., to Pampa, Texas, where it is operated as the Franks Division of Cabot Shops.

Most recently, the firm has developed "Cab-O-Sil" and plans a new unit for its production

The most recent Cabot research has resulted in the development of "Cab-O-Sil", a fine white silica product. Now manufactured exclusively for Cabot by a German concern, it will soon be manufactured in this country at a new plant near Tuscola, Ill.

Starting as a one man concern, Cabot has followed a steady course over the last 75 years, adapting itself to the needs of American and later to world consumers. The company's characterization of itself is "a company that took smoke, which was a nuisance, and helped make it a world necessity."

The Canal facility near Franklin, La., one of Cabot's most modern, consists of a gas furnace, oil furnace and thermal plant.

Names in the News

John R. Eck, formerly general manager of the Monsanto Inorganic Chemicals Division, has been elected president by the board of directors of the Mobay Chemical Co.

Paul J. Mayle, executive vice-president of the Dayton Rubber Co. and **Glenn E. Mallory,** secretary-treasurer of the American Latex Products Corp., a subsidiary of Dayton Rubber, have been elected to the board of directors of the parent company.

Chester J. Noonan, vice-president of the U. S. Rubber Co., has been named chairman of the Rubber Products Division of New York Chapter's 1958 Red Cross campaign, and **Richard Meehan,** executive vice-president of H. Muelstein & Co., has been appointed chairman of the Crude Rubber Brokers & Importers Division.

Raymond Stevens has assumed the duties of president of Arthur D. Little, Inc., and **Allen Latham, Jr.,** vice-president of engineering, has been elected a director. **Earl P. Stevenson** continues as chairman of the board.

Maurice O'Connor and **Joseph Ross,** of O'Connor & Co., Inc., have been appointed mid-western sales representatives for the U. S. Rubber Reclaiming Co., Inc.

Dr. Forrest W. Shaver has been named senior scientist of the Chemicals Research Department of the B. F. Goodrich Co. Research Center.

R. S. Sanders, manager of Pliobond sales, was presented recently with a lapel pin emblematic of 35 years of continuous association with the Goodyear Tire & Rubber Co.

Frank G. Hager has been named manager of truck tire sales of the Seiberling Rubber Co., succeeding **O. K. Feikert** who has been named assistant sales manager.

J. D. Hershey has been named director of public relations for the Dayton Rubber Co. succeeding **Ray L. Wetzel** who retired March 1.

Dale J. Milnes, formerly manager of the Ozone Equipment Division, has been appointed president of the Ozone Research & Equipment Corp.

William J. Wertz has assumed the duties of general manager of the M. E. Wallace Co., replacing **Robert E. Diehl** who is no longer connected with the company.

Robert F. Hill, formerly assistant sales manager of the Vinyl Resin Department of Mansanto Chemical Co., has been appointed sales manager of the Eleonora Chemical Division of the Pantasote Co.

Harry T. Goodenberger, formerly associated with the Goodyear Tire and Rubber Co., has been named vice-president in charge of tire sales for the Dayton Rubber Co.

William P. Gage, president of Grace Chemical Co., is again serving as chairman of the Chemical, Paints and Rubber Committee in the Commerce and Industry Division of the Salvation Army 1958 Appeal in New York City.

C. H. M. Baker, chief purchasing agent for the company since 1947, has been appointed to the board of directors of the Firestone Tyre and Rubber Co., Ltd., Brentford, England.

Robert S. Parkins, previously senior process engineer at the Ashtabula chemical plant for the General Tire & Rubber Co., has been named staff development engineer in the company's Chemical Division.

S. William Riley, who was formerly associated with the McNeil Machine and Engineering Co., has been appointed chief project engineer for the Quaker Rubber Division of H. K. Porter Co., Inc.

Dr. John C. Lawler, formerly technical coordinator at the Linden, N. J., plant for General Aniline & Film Corp., has been named special projects coordinator for the company's Dyestuff and Chemical Division.

C. L. Metzger, previously manager of the Associated Merchandise Department, has been appointed manager of the Retreading and Equipment Sales Division for the Goodyear Tire & Rubber Co.

Ray B. Ralph has been appointed personnel manager of the Oliver Tire & Rubber Co., Oakland, Calif.

John D. Gans, formerly merchandising manager, has been named manager of the Commercial Sales Division, Rubbermaid Inc., Wooster, Ohio.

Carroll B. Hoffman, previously vice-president of the J. M. Lehmann Co., Inc., has been named manager of the Precision Equipment Division for the De Laval Separator Co.

C. Chester Bassett, Jr., has resigned as vice-president of sales of the American Enka Corp. The office of vice-president of sales had been discontinued and sales activities will continue under the direction of **Dr. J. L. Bitter,** marketing vice-president.

Henry A. Haas, formerly manager of material and equipment sales for the General Tire & Rubber Co., has been appointed sales manager of the Automotive Accessory Division of the Bearfoot Airway Corp.

Oka Carlson, formerly superintendent of cascade (production) operations at the Goodyear Atomic Corp., has been appointed manager of Goodyear's new plastics plant at Apple Grove, West Va.

A. N. Spanel, board chairman of International Latex Corp., has been presented with a 2,000-year-old amphora, a vessel for transporting wine, on behalf of the people of Fos-su-Mer and their mayor, Jean Bouilloud, for "helping cement the relations" between the United States and France.

Earl A. Hensal, vice-president in charge of production at the Seiberling Rubber Co., has been named national chairman of the 1958 Akron University Fund.

George Thorn, formerly vice-president of the Conti Rubber Co., has been appointed sales manager of the Belting Division for the Boston Woven Hose & Rubber Co.

William E. Boruff. who has held various chemical company posts since 1947, has been appointed sales development engineer for the Chemical Division of the General Tire & Rubber Co.

William H. Matz has been promoted from senior chemist of Carbon Division research to supervisor of quality control for the Chemical Group of the Pittsburgh Coke & Chemical Co.

Carl W. Brodt, who has been associated with Firestone since 1936, has been named plant manager for the Firestone Rubber and Latex Products Co.

John C. Milne, formerly manager of machine design, has been named product manager for compound-applying machinery for Dewey and Almy Chemical Co.

Gale F. Muchmore has been appointed to the newly created post of products manager of rubber and all-vinyl tile for the Mastic Tile Corp. of America.

Edward F. Kiernan has been appointed to the Plastic Film and Sheeting sales staff of the Goodyear Tire & Rubber Co.

F. A. Bozzacco has been appointed sales engineer of the Coatings Department of the Chemical Division, Goodyear Tire & Rubber Co.

Professor Giulio Natta of the Polytechnic Institute of Milan has been elected unanimously as a Fellow of the New York Academy of Sciences in recognition of his outstanding achievements in science.

James P. Drury, formerly production control manager of the Tire Division of the Seiberling Rubber Co., has been appointed superintendent of automobile floor mat production.

E. A. Orem, formerly head of industrial chemical sales for the Grasselli Chemicals Department, E. I. du Pont de Nemours & Co., Inc., has become a sales consultant with Amoco Chemicals Corp., Chicago, Ill.

Goodyear Begins Production of Videne Polyester Film

► Goodyear Tire & Rubber Co., Akron, Ohio, has announced the development of a new plastic, "Videne," a polyester laminating film to be used as a protective and decorative surface for a wide variety of products in a number of industries. Goodyear has also announced plans for construction of a $9,000,000 Videne manufacturing plant at Apple Grove, West Va., which is scheduled for completion in 1959. The new plastic is being manufactured at the present time in 54" widths and thicknesses ranging from 200 to 750 gauge in two basic forms: Videne A, which is being produced for direct or stretch-laminating applications in the textile, metal, wood, paper, plastic and packaging fields, and Videne TC, a 40-gauge transparent wrap for machine packaging of meat and other food products.

The chemical nature of Videne A is described as an unoriented, amorphous, thermoplastic material which cannot be crystallized, and differs from other plastics in several respects. It can be laminated under heat and pressure to textiles, metals and certain plastics without adhesives and will vacuum form or draw to the limits of supporting materials. Goodyear's new film, when laminated to fabric, has the unique feature of intensifying background colors in addition to protecting the surface of the fabric. As a surfacing for plywood, Videne brings out depth of grain, serves as a protective covering and eliminates need of varnish or lacquer. In addition, it can be used as the adhesive between wood plies at the same time the surface film is applied.

Other Physical Properties

Another important physical property of Videne is that it can be embossed and printed, opening unlimited possibilities of style and design in decorative surfaces. Gloss or reflection of the finished surface runs from high to low, depending upon the type of Videne film used, and is controlled by the lamination technique involved. The interior and exterior aging factor of the material also is significant. In tests undertaken by the company in Florida and Arizona, the film withstood the elements for more than a year without discoloring or exhibiting surface cracking.

Videne acts as a self-adhesive under heat and pressure to most rigid and semi-flexible plastics. However, polystyrene, high-impact polystyrene, rigid vinyl, and semi-rigid vinyl require an additional adhesive in Videne A laminations. Applications in this field, which can be decorative as well as protective by printing and embossing the film, include bath tubs, boat surfaces, wall tiles and similar items, Goodyear states.

Videne TC, a derivative of Videne A, has unusual strength in an unsupported state, even at extremely low temperatures. It is chemically identified as an oriented or stretched, thermoplastic coated material which is heat-shrinkable within a controlled temperature range. Possessing unusual transparency, it has a high resistance to abrasion and breakage which are major hazards in packaging uses. Heat-sealable, Videne TC is believed to be the first shrinkable film with enough inherent rigidity and dimensional stability to be run on commercially available automatic packaging machines.

Silastic Adhesive S-2200

► Dow Corning Corp., Midland, Mich., has developed a new, easily applied high bond strength silicone rubber adhesive. Identified as "Silastic Adhesive S-2200", the material is translucent, non-toxic, contains no solvent and may be applied with knife or spatula. Silastic S-2200 was designed to bond vulcanized silicone rubber parts and vulcanizes to create a strong bond in five minutes at 240°F to 270°F. The new adhesive is also recommended by the company for bonding silicone rubber to a variety of common metals. The company states, however, that optimum adhesion to metal requires a cure of about four hours at 480°F under firm contact pressure. Good adhesion may be obtained with shorter cures through use of A-4094, a silicone primer which air-dries in 30 minutes. Tests indicate that cured films develop strength in the order of 25 pounds pull per inch width and retain both mechanical strength and full resilience at temperatures ranging from -70° to 500°F.

Copyright Violations Reported

► Sun Rubber Co., Barberton, Ohio, has reported infringement of the company's copyright and trade-mark rights by foreign manufacturers of dolls and toys. Sun has cautioned doll and toy distributors and dealers of the infringement and of the possible use, unknowingly, of such illegally produced merchandise. In a letter to its customers, Sun Rubber reported that some of the company's outstanding creations of dolls and toys have been reproduced in foreign countries and shipped into the United States. The designs have been copyrighted by Sun in both the United States and Canada and the names of many of the creations are also covered by trade-mark registration. The company statement said: "In order to protect our own interests and those of our distributors and dealers who legitimately buy and sell our creations, we shall take all legal steps necessary to protect our copyright designs and trade-marks from illegal sale."

Announces New Acquisition

► Molded Fiber Glass Co., Ashtabula, Ohio, has purchased equipment and inventories of the Fiberglass Reinforced Plastic Molding Division of American Hard Rubber Co., Akron, Ohio. Production of the fiber glass reinforced plastic part formerly custom molded by American Hard Rubber has also been taken over by Molded Fiber Glass.

Some of the uses of Videne showing the versatility of the new plastic are shown above: (1) Videne A dry laminated to printed wall paper; (2) Videne A dry laminated to foil for packaging applications; (3) Videne A dry laminated to paper for packaging applications; (4) Printed Videne A laminated with adhesive to vinyl for wall covering applications; (5) Embossed Videne A dry laminated to steel panels for exterior and interior construction applications; (6) Embossed Videne A dry laminated to aluminum panels for exterior and interior construction applications; (7) Videne A dry laminated to spun glass place mats; (8) Videne TC used as wrap for fresh meats and poultry; (9) Videne A dry laminated to aluminum and vacuum formed into serving tray; (10) Printed Videne A laminated with adhesive to polystyrene and vacuum formed into serving tray; (11) Sample roll of satin finish Videne A; (12) Sample roll of clear finish Videne A, and (13) Printed Videne A laminated with adhesive to polystyrene and vacuum formed into medicine cabinet.

News in Brief

► Custom Scientific Instruments, Inc., Kearny, N. J., has issued catalog No. 58 which contains illustrations and brief descriptions of 50 different units.

► Dow Chemical Co., Midland, Mich., made an across-the-board reduction of two cents per pound for seven resin-grade polyglycols. The products, all tailored for urethane use, include one diol and six triols.

► A cork-type filling adaptor, which may be used for filling any standard size Tote Bin or for specially-fabricated bins of different sizes, has been developed as standard accessory equipment by the Tote System, Beatrice, Neb.

► Development of an Industrial Wire Cloth Calculator which gives direct readings of the per cent of open area of any wire cloth has been announced by the Reynolds Wire Division, National-Standard Co., Dixon, Ill.

► Goodyear has released a booklet describing the machines and processes used in the production of V-belts, which includes sections on rubber compounding, preparation of fabric, building steps, curing and finishing.

► Barrett Division of the Allied Chemical & Dye Corp. has announced that new facilities for the volume production of refined anthracene are in operation at its Ironton, Ohio plant.

► "Properties, Reactions and Uses of Thioglycolic Acid" is the title of a 20 page catalog, published by Evans Chemetics, Inc., 250 E. 43rd St., New York, N. Y., which is said to contain the most complete information to date on thioglycolic acid.

► Seiberling Rubber Co. has issued the "Seiberling Product and Data Book" describing the company's lines of tires and offering technical data and information on tire care, batteries, etc.

► Moore & Munger, marketers of industrial waxes and clays have announced that more than 1,200,000 pounds of "Paraflint", a synthetic paraffin imported from South Africa, have been shipped to customers throughout the United States since the beginning of this year.

► "The Truth about Tubeless Truck Tires" has been released by Firestone in order to answer questions in connection with the tubeless tire in the truck field.

► Pyridine N-oxide, previously available only in laboratory quantities, is now being offered in commercial quantities by Beacon Chemical Industries, Inc. A technical data sheet on the product is available from the company.

► "Technical Bulletin No. 13" on RC Rigid Plastisol, has been released by the Rubber Corp. of America to describe a recently developed rigid plastisol compound, which is said to fuse to a Shore "A" hardness of 100.

► "Evaluation of Chlorinated Paraffin as a Secondary Plasticizer for Polyvinyl Chloride", a factual, 15 page bulletin prepared for manufacturers of products utilizing PVC resins, has been issued by the Chlorinated Products Division of the Diamon Alkali Co., Cleveland, Ohio.

► A brochure illustrating the characteristics and applications of Cycolac, a thermoplastic resin, is available from the Marbon Chemical Division of the Borg-Warner Corp., Gary, Ind.

► A new technical bulletin presenting the properties, shipping information, solubilities and performance data and applications of 1,2,6-hexanetriol has been released by Union Carbide Chemicals Co.

► A new colorless curing agent for epoxies, which is said to permit the development of high temperature properties epoxies, has been announced by Furane Plastics, Inc.

► Wellington Sears Co. is moving its New York office to new quarters at 111 West 40th St., to provide better service to customers by offering a more central and convenient location and shortening lines of communication.

► The Akron office of Farrel-Birmingham Co., Inc., has been moved to 665 W. Market St. The telephone number remains the same, Portage 2-8871.

► Terrazzo-style rubber flooring, produced by Goodyear, is now available in 14 decorator and commercial colors.

► Canton Containers, Inc., has introduced film made of Bakelite polyethylene to be used as protection against inclement weather in construction projects.

► "Vinyl Plasticizers", a new technical bulletin issued by Argus Chemical Corp., 633 Court St., Brooklyn 31, N. Y., gives detailed data on properties, performance characteristics and recommended uses for monomeric epoxy plasticizers, "Drapex 3.2" and "Drapex 4.4".

► Thiokol Chemical Corp., 780 N. Clinton Ave., Trenton 7, N. J., has issued a reprint of an article which recently appeared in RUBBER AGE, entitled "Compounding Butyl Rubber for Resistance to Compression Set".

► "Material Handling Films", a 24-page catalog listing over 60 education and training films offered for free loan, is the title of a booklet published by the Material Handling Institute, Inc., One Gateway Center, Pittsburgh 22, Penna.

► Reliance Totally Protected Pump Motors, from ⅛ to 1,000 horsepower, are described in the new four-page Bulletin B-2507, published by the Reliance Electric and Engineering Co., 24701 Euclid Ave., Cleveland, Ohio.

► "Silicas" is the title of a report on white carbon black published in Hi-Sil Bulletin No. 16 by the Columbia-Southern Chemical Corp., One Gateway Center, Pittsburgh, Penna.

► Spruance semi-automatic tire cord clamps are now available on the vertical X-3 Tensile Tester, manufactured by Scott Testers, Inc., 85 Blackstone St., Providence, R.I.

► Phillips Chemical Co., Akron, Ohio, has issued Bulletin No. 31, illustrating the effect of substituting Philprene 1708 in whole or in part for natural rubber in industrial applications.

► Gardner Laboratory Inc., Bethesda 14, Md., has announced the development of a new air-operated vacuum cleaner named "Little Windy" Air Vac and the 1958 models of the Gardner Portable Glossmeters and Portable Reflectometers.

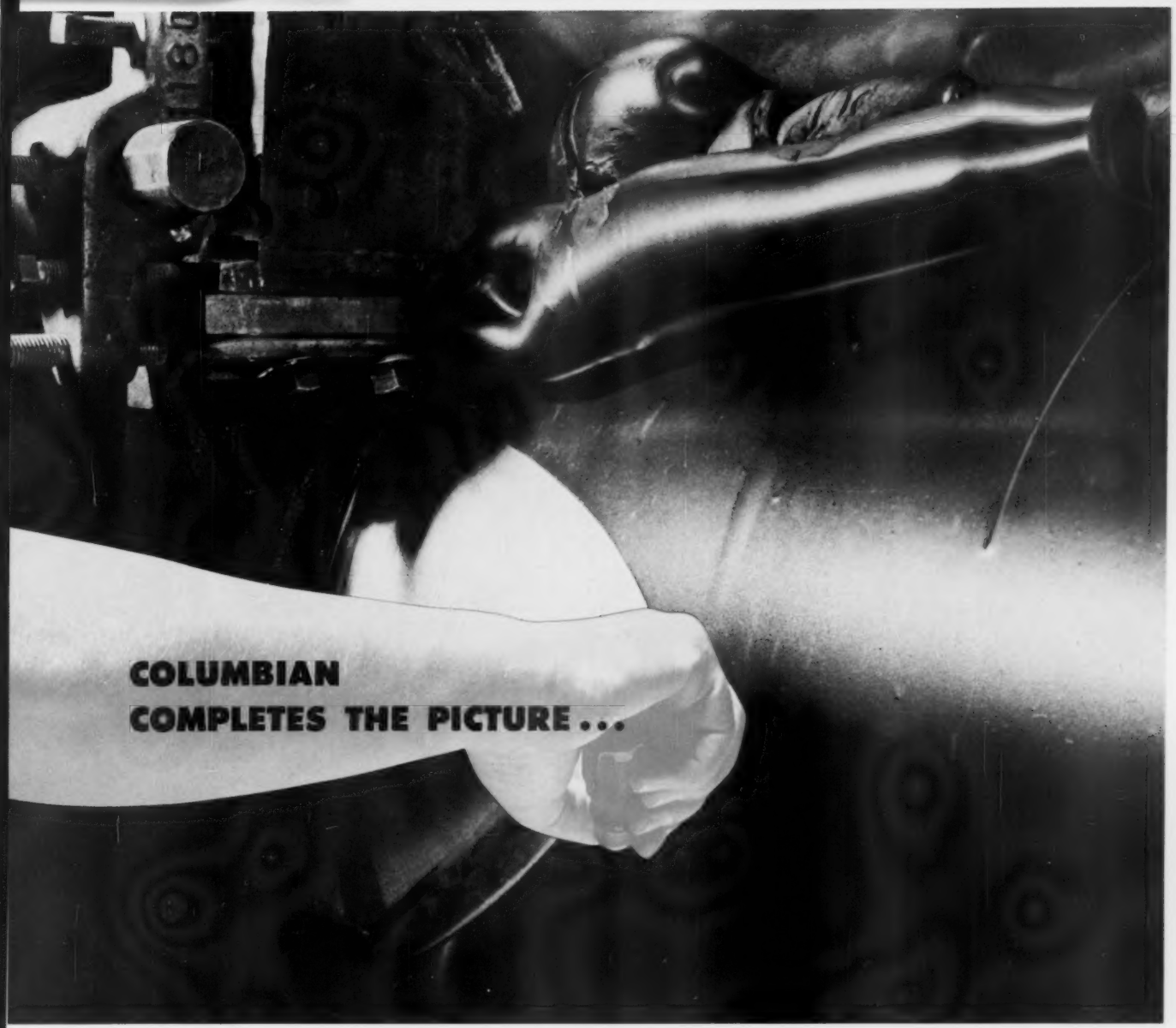
► A new series of Tech Book Facts bulletins, 57-81 Rotational Molding Plastisol; 57-9 Cove Base Formulation; and 57-10A Metal Coating Organosol, released by the Chemical Division of the Goodyear Tire & Rubber Co., stress versatility as an important asset of the Pliovic family of vinyl resins.

► A neoprene coated nylon pool cover which is secured by small sandbags inserted over the cover at the pool's drainage ledges, has been developed by the Aldan Rubber Co., Philadelphia, Penna.

► Industrial Chemicals Division of Olin Mathieson Chemical Corp., 460 Park Ave., New York, N. Y., has issued a 16-page booklet describing the characteristics, grades and containers for 24 basic chemicals used by industry.

► Carwin Co., North Haven, Conn., has published a new 28-page "Product Catalog" describing the company's complete product line including chemical intermediates for the dyestuff, pigment and pharmaceutical industries, as well as isocyanates for foam, adhesive, resin, elastomer and other end uses.

► National Aniline Division of the Allied Chemical & Dye Corp., 40 Rector St., New York, N. Y., has issued "Technical Bulletin I-20" on Naxol (Cyclohexanol). The 32 page booklet contains what is believed to be the most complete data to be assembled on this chemical intermediate.



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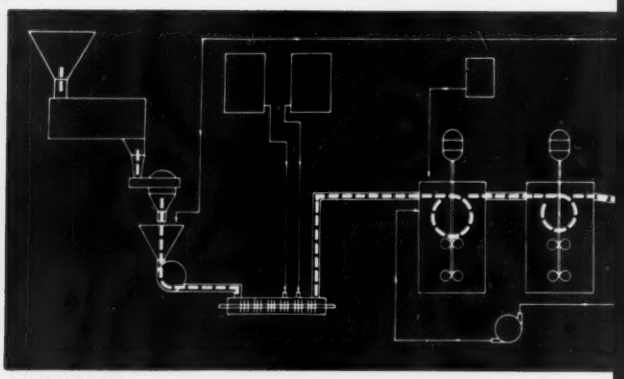

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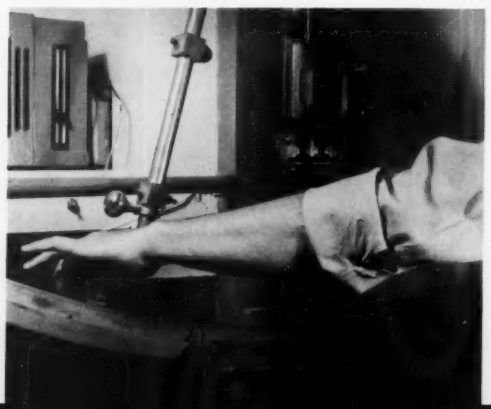

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NBS Promotes Wichers

► National Bureau of Standards has appointed Dr. Edward Wichers associate director for chemistry, succeeding Dr. Wallace R. Brode, who has been granted a leave of absence to serve as science advisor to the Secretary of State. Dr. Wichers has been associated with the Bureau for some 40 years and has served as chief of the Chemistry Division since 1948. Born in Zeeland, Mich., Dr. Wichers received his B. A. degree from Hope College in 1913, his M. S. degree from the University of Illinois in 1915 and his doctorate from the same institution in 1917.

Dr. Wichers has conducted research in analytical chemistry, centering on platinum metals, rare earths, reagent chemicals and pure substances. He has been president of the Chemical Society of Washington and has held important posts in the American Chemical Society. Currently, he is president of the Inorganic Chemistry Section of the International Union of Pure and Applied Chemistry. This section comprises the Commission on Physico-Chemical Data and Standards, of which he is vice-chairman; and the Commission on Atomic Weights, of which he is president. Among the honors which Dr. Wichers has received is the Hillebrand prize from the Washington Section of the American Chemical Society and the Department of Commerce Exceptional Service Award, accompanied by a citation "For major contributions to the science of precision analytical chemistry, in both the national and international field."

Named Technical Representative

► Roy E. Pyburn has been appointed technical field representative for the newly formed Elastochem Division of Seaboard Chemicals, Inc., Salem, Mass. Mr. Pyburn was formerly employed by the U. S. Testing Co., the American Resinous Chemicals Corp. and was chief chemist for the Foss Chemical Co. In his new position he will head field sales and services for the Elastochem Division which specializes in the manufacture of tie-coats, paper and fabric saturants, specialty adhesives, fabric and rug backings, dip coats and binders. Mr. Pyburn attended Boston University before entering the rubber field.

Closes Milan Facility

► U. S. Rubber Co., New York, N. Y., will transfer operations of the footwear plant in Milan, Tenn., to the Mishawaka, Ind., plant in order to affect economies necessary to meet increasing competition from low priced rubber and canvas footwear manufactured here and abroad. The Milan facility, which was opened in 1947, will be closed with stepwise reduction of employees until the final closing date in July. Floor space has been made available at the Mishawaka unit by reduced government requirements for self-sealing airplane fuel cells and rearrangement of foam rubber processing operations.

H. M. Fisher

Named Biggs Foundry Officer

► Announcement has been made that H. M. Fisher has been appointed vice-president in charge of engineering and production for the Biggs Foundry and Fabricating Co., Akron, Ohio. Biggs Foundry is a subsidiary of the Union Spring Co., New Kensington, Penna. Mr. Fisher, formerly senior project engineer in the Mechanical Engineering Laboratory of the Firestone Tire & Rubber Co., held positions with Adamson United Co. and the Baldwin Rubber Co. A World War II Navy veteran, Mr. Fisher is a registered Ohio professional engineer, and is a member of the American Society of Mechanical Engineers and the University Club of Akron.

Develops Styrokote Process

► Protective Coatings, Inc., Tampa, Fla., has developed what is said to be a simple process for providing surface strength to either panels or shapes of expanded or foamed polystyrene. In application, a resistant skin, called "Styrokote", is applied as a liquid by brush, roller, trowel or squeegee directly to the polystyrene. The company states that the new "Styrokote Process" provides extraordinary adhesive strength without damaging the polystyrene and can also be employed to bond an unlimited variety of rigid or flexible materials including polystyrene to the polystyrene to meet many structural, protective or decorative requirements. The strength of the Styrokote skin is adjusted to suit requirements by variations in application, using the liquid alone, or by sandwiching one or more layers of fiber glass cloth between coats of the materials to achieve resistance to shock, impact, abrasion, corrosion, heat, weather and water. Styrokote is the exclusive development and formulation of Protective Coatings, Inc., which has filed application for patent rights.

An index to Volume 82 of RUBBER AGE will be found on pages 201 to 204 of this issue.

DuPont Promotes Four

► E. I. du Pont de Nemours and Co., Inc., has announced the appointment of four section managers for the new Technical Service Laboratory of the Pigment's Department. Dr. Willard H. Madson has been named manager of the trade sales paint section; George Wormald, manager of the industrial and automotive finishes section; Dr. Harold C. Brill, manager of the paper, ink and fibers section, and Robert H. Zabel, manager of the plastics and elastomers sections. Dr. Madson, who was educated at St. Olaf College, the University of Wisconsin, and the University of Illinois, joined Du Pont in 1933. Specializing in research and sales service work on pigments, Dr. Madson has been sales service division head for white pigments since 1944.

Mr. Wormald joined the company in 1936 as a laboratory assistant at the Newark, N. J., color pigments plant. A graduate of Newark College of Engineering, he was transferred to the color sales service laboratory as a chemist in 1947. Dr. Brill, was previously research supervisor in the Newark, N. J., sales service laboratory. He joined the company in 1935 as a chemist, after completing his education at Muskingum College and Ohio State University. Mr. Zabel, a graduate of the University of Wisconsin, joined Du Pont in 1948 as a production supervisor at Newark, N. J. In 1949 he was assigned to the Newark sales service laboratory.

Goodyear SS-75 Pliofilm

► Goodyear Tire & Rubber Co., Akron, Ohio, has announced the manufacture of a new "SS-75 Pliofilm" by the Packaging Films Department. The new film was designed specifically for wrapping fresh or frozen meats at the self-service trade levels, providing visibility, moisture, product quality and protection. According to Goodyear, the new SS-75 has window-like clarity and keeping quality superior to that found in any previous Pliofilm. Durable and puncture-resistant, the new wrap is said to retain dimensional stability and positive heat sealing qualities, conform to irregular surfaces, to be waterproof, and provide an attractive, skin-tight package for product display at the point of sale.

Oronite Forms Export Company

► Oronite Chemical Co. of San Francisco, Calif., a subsidiary of the Standard Oil Co. of Calif., has announced the formation of California Chemical International, Inc., to take over its export activities. The new concern will maintain executive headquarters in San Francisco and will maintain branch offices in Geneva and Panama City. California Chemical will have marketing responsibility in all foreign countries except Canada, which will continue to be served directly by Oronite. It will also take over the operation of Oronite's leased bulk terminals in foreign areas. Oronite markets a broad range of petrochemicals.

West Coast News

► The March 4th meeting of the Los Angeles Rubber Group held at the Hotel Biltmore in Los Angeles, Calif., featured a paper by T. A. Bulifant (Barrett Division), who spoke on "Low Molecular Weight Polyethylene in Rubber Compounding." The non-technical portion of the meeting was addressed by Jack L. Heckel, adminstrative assistant on the Vanguard project, Aerojet Systems Division, Aerojet-General Corp. Mr. Heckel discussed the "Vanguard Earth Satellite Program."

In his address, Mr. Bulifant stated that within the last decade, ethylene polymers of low, high and intermediate molecular weights have become important tonnage materials in rubber, plastics and in numerous other applications. Of particular interest to rubber compounders, he said, are the low molecular weight (1500 to 2000), low density (0.92), and low melting point (88 to 103°C.) polyethylenes manufactured by the Allied Chemical & Dye Corp. and marketed under the "A-C" tradename.

Developed several years ago, these ethylene polymers are quite unique, he said, in that a study of their physical and chemical characteristics shows them to be hard, wax-like, non-toxic, non-discoloring, non-migrating, light stable, inert, and resistant to moisture and chemicals.

These polyethylenes behave as processing aids, tack-modifiers and lubricants. Their compatibility in the different elastomers is relatively high, the speaker pointed out, even when used in concentrations as high as 10 parts to 100 parts of elastomer. The polyethylene lubricants do not bloom from either uncured or cured stocks, Mr. Bulifant noted. These lubricants contribute to easy release from mill, Banbury or calender at elevated temperatures. In addition, better mold flow and release properties are obtained.

From 2 to 5 parts of polyethylene usually are sufficient to provide any necessary improvement in processability and mold flow properties without causing any major changes in vulcanizate properties.

Laboratory evaluations of the three available grades of polyethylene lubricants in the various elastomers have indicated no significant behavior differences among them. In certain instances, however, one grade may be preferred over the other. The most popular grade, stated Mr. Bulifant, is the low molecular weight (1500) and low melting point (90°C.) material, probably because of its greater ease of dispersion. The three grades are manufactured in both pelletized and powdered form. The pellets are recommended for Banburys and the powder for open mill mixing.

► Kirkhill Rubber Co. has completed installation of a new Rotocure unit at its plant in Brea, Calif. The Rotocure cures continuous sheet rubber goods up to 72 inches wide. Kirkhill Rubber has constructed a new wing to house the machine.

► Rhodia, Inc., New York, N.Y., has announced the appointment of Frank L. Peirson to its Alamask Odor Control Division in the Western district. He was formerly associated with the Los Angeles Chemical Co.

ARI Tire Film Released

► American Rayon Institute, Inc., New York, N. Y., has announced that a new 15-minute sound and color film, "Getting Down to Casings," is now ready for distribution to groups in the tire, rubber and automotive fields across the country. The film is based on the results of recent technical research and comparative rayon-nylon tire cord tests, conducted by independent research organizations, covering heat and impact resistance, tread life, stability, retreadability and noise levels. In each of these areas the film presents detailed laboratory and field test evidence of the superior qualities of rayon tire cord for the manufacture of safe, quiet, smooth-running, long-lasting tires. Although the film will be of general interest to a wide audience, including the average motorist, it has been designed to approach the subject primarily at the sales promotional level and includes a series of simple, point-of-sale demonstrations which the tire and automobile dealers and their sales staffs will find interesting and valuable.

Enjay Opens New Sales Office

► Enjay Co., Inc., New York, N. Y., has announced the opening of a new sales office at Charlotte, N. C., to serve the southeastern industrial region. Covering North Carolina, South Carolina, Georgia, Florida and parts of Virginia and Tennessee, the new unit is centrally located in an important and growing industrial area, the company believes. J. W. Toney will be in charge of the new sales office with D. L. Duncan serving as technical representative. Located at 207 Hawthorne Lane, the Charlotte office is Enjay's ninth sales unit.

Named Kenrich Representative

► Arthur Goldman has joined Kenrich Corp., Maspeth, N. Y., as a technical representative covering the eastern territory including New York, New Jersey, Delaware, Pennsylvania and Virginia. A graduate of Ohio University and Polytechnic Institute of Brooklyn, with an M. S. in chemistry, Mr. Goldman is well known in the rubber and plastics industry.

Rubber Shippers Organize

► In recognition of the fact that the cost of transportation has risen to new highs, the newly formed Rubber Shippers Association, Inc., will pool, consolidate, transport and distribute freight that is shipped in less than carload quantities. The objective will be to obtain the lowest available freight rates for any firms that have occasion to ship small quantities of products. Supporting this movement is the Traffic Committee of the Rubber Manufacturers Association, Inc., New York, N. Y., which hoped to get the new plan in operation before April 1. The program will be initiated in the New England area where at least 180 companies are eligible to participate. The committee estimates the potential tonnage on shipments from New England to West Coast destinations at 40 million pounds a year. Consolidated terminals will be set up in Boston, Worcester and Springfield, Mass., and Providence, R.I. Distribution terminals will be set up in Los Angeles and San Francisco, Calif., in Portland, Ore., and Seattle, Wash. Consolidated terminals are also being planned for Akron and Cleveland, Ohio, Detroit, Mich., and Chicago, Ill.

Constructs New Facility

► The C. P. Hall Co. of Illinois, Chicago, Ill., has announced the construction of a new building, which is scheduled for completion during April. The brick and steel structure, which will have 21,000 square feet of floor space on a 4 acre plot, will be used for offices and warehouse and will be so constructed that it can be enlarged to meet growing requirements. The new unit will be equipped with the latest in material handling equipment and will be served by the Belt Railroad. The company's present building at 5145 W. 67th St., Chicago, Ill., will be converted in its entirety to the manufacture of the company's products. New equipment will be added to increase the production capacity of esters, plasticizers, surface active agents, and defoamers used by the rubber, paint, paper, cosmetic, pharmaceutical, household and chemical specialty manufacturing industries. Existing research laboratory facilities in the present building will be enlarged to include a new laboratory for technical service applications.

Named Manufacturing Director

► The appointment of Howard H. Deem as director of manufacturing for both Valvair Corp. and Sinclair-Collins Valve Co., has been announced by company officials. Mr. Deem will direct manufacturing and foundry operations in the company's Akron, Ohio, and Canton, Penna., plants. Prior to joining Valvair and Sinclair-Collins, Mr. Deem was supervisor of the plant and manufacturing engineering section of the Cleveland foundry of the Ford Motor Co., and spent one year in the Experimental Production Department of E. I. du Pont de Nemours & Co.

Goodrich Promotes Two

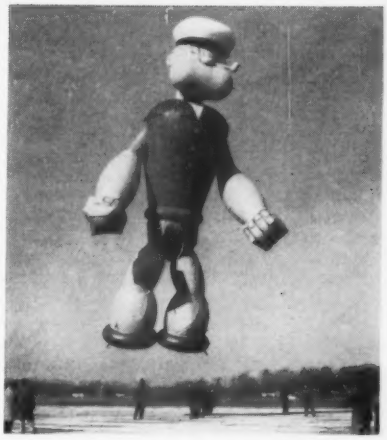
► Development Center of the B. F. Goodrich Chemical Co., Avon Lake, Ohio, has announced the appointment of David W. Montgomery and Robert R. Bloor as senior technical men. Mr. Montgomery is a 1947 graduate of Purdue University where he received a bachelor's degree in chemical engineering. He joined Goodrich in Akron in 1947 as a junior technical man in the general chemical laboratory. In 1949, he was transferred to the Akron experimental station of the chemical company and worked in the analytical group as a development engineer, until 1951. He was then transferred to the Development Center at Avon Lake and was assigned to the analytical service group. Mr. Montgomery is a member of the American Chemical Society, the American Association for the Advancement of Science and the Society of Photographic Engineers and Scientists. Mr. Bloor, a native of East Liverpool, Ohio, received his Bachelor's degree in chemistry from Ohio University in 1947 and his Master's degree in 1948 from Michigan State University. He joined the chemical company in 1948 as a junior technical man at the Development Center at Avon Lake. A year later, he was advanced to technical man rating.

Nuclear Polymer Use Studied

► Two reports of recent research into the use of polymeric materials in nuclear powered and other supersonic aircraft have been released to industry through the Office of Technical Services, U. S. Department of Commerce. One volume, *Electrical Properties of Irradiated Polymers*, by R. E. Woodard, Wright Air Development Center, U. S. Air Force, June 1957, 32 pages, deals with efforts to develop improved engineering materials for nuclear powered aircraft and supersonic vehicles. The other report, *Development of Thermally Stable Polymeric Materials*, by C. P. Haber, U. S. Naval Ordnance Laboratory for Wright Air Development Center, U. S. Air Force, June 1957, 67 pages, is concerned with the synthesis of new, highly stable polymers. The publications are available from the Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C.; PB 131254, $1.00, and PB 131253, $1.75, respectively.

Ace Rubber Names Croysdale

► Robert T. Croysdale, formerly plant manager of the Phoenix Manufacturing Co., has been appointed factory manager for Ace Rubber Products, Inc., Akron, Ohio. Mr. Croysdale, a native of Akron, is a graduate of Miami University, attended Akron Law School, and served for three years in the United States Navy. With wide experience in the rubber industry, he has served as general foreman of the Molded Goods Division for the B. F. Goodrich Co.; plant manager of the Foam and Flooring Division of Hewitt-Robins, Inc. and general superintendent of the Rubber and Plastics Division for the Brunswick-Balke-Collender Co.



Popeye Highlights Macy Parade

► The annual Macy's Thanksgiving Day Parade highlighted a 56 foot figure of "Popeye", the well known cartoon character, which had been built by the Aviation Products Division of the Goodyear Tire & Rubber Co., Akron, Ohio. Ominously proportioned, the figure balloon had hands, six-foot square; forearms, seven feet in diameter; a 16 foot chest; nine foot waist, and eight foot legs. His feet were 10 feet in length; he was 16 feet across in the shoulders; had a 21 foot reach; a five-foot neck and a 14 foot head. More than 6,000 cubic feet of helium was required to inflate Popeye, who weighed 250 pounds deflated. Inflated, he weighed approximately 110 pounds. More than 600 yards of neoprene-coated nylon fabric was required to build Popeye. He was formed by cementing 243 fabric patterns together. There were 10 inflation valves and 23 patches to hold lines for handling. To paint the figure, required 10 gallons of blue, five gallons of red, one gallon of black and 17 gallons of white paint. More than 25 gallons of neoprene air curing cement was used to put the figure together. The fifth figure balloon to be manufactured by Goodyear, the others were a soldier, a spaceman, "Gorgeous Gobbler" and an observation balloon.

Chemstrand RHB Type Nylon

► Commercial production of "RHB" type nylon tire and industrial yarn, offering greater strength, higher thermal resistance and better adhesion values than tire yarns currently available, has been announced by the Chemstrand Corp., New York, N. Y. The new nylon yarn will be offered in 840 denier and 140 filaments. Chemstrand officials said that in order to help tire companies convert to the new RHB yarns achieving optimum results, technical assistance will be offered to processors in adapting the yarn to their machines. RHB nylon yarn was developed as a result of Chemstrand's broad programs on the research and marketing levels designed to establish maximum utilization of nylon yarn in tires. Chemstrand HB nylon yarn will continue to be available to those tire companies and industrial users who desire this type of yarn.

Seiberling Improvement Program

► Seiberling Rubber Co., Akron, Ohio, has undertaken an expenditure of almost $1.5 million for production equipment in a two-year plant improvement program intended to meet growing requirements in the tire replacement market. New factory equipment costing $850,000 has already been installed at Seiberling's headquarters in nearby Barberton and another $620,000 will be spent this year. The company's major expenditure will be for new tire building and tire curing equipment. By the end of 1958, more than $700,000 will have been spent for automatic machines and presses, including new equipment for the building and curing of earthmover tires in 18.00-33 sizes. These tires, for giant highway construction vehicles, are being produced at Seiberling's Barberton plant for the first time with 33-inch rim diameters. Other improvements under the program include: modernization of equipment in the Milling Division; Development and installation of new finishing machines for white sidewall tires; Addition of new equipment for the special treatment of nylon cords under high temperature and tension conditions, and the installation of an additional Beta ray gauge system in the calendering division.

Testing New Goodyear Tire

► Goodyear Tire and Rubber Co., Akron, Ohio, has developed a new sidewall inflated tubeless airplane tire, which is currently being field tested on the Chance Vought F8U-1 Crusader, a United States jet plane. The tire is filled with air by inserting an inflation needle through a rubber sidewall valve and is said to offer a number of advantages. These include elimination of the wheel-weakening valve hole; greater flexibility in brake design; mounting of dual tire on single wheels without sacrifice to the safety of individual inflation; easier stockage of spare valve parts; elimination of loose and leaking valve stems; elimination of damage to exposed rim valves; easier replacement of valves in the field, and lighter weight. Another potential advantage is that several sidewall valves may be spaced in the same tire so that one valve is accessible for inflation purposes despite partial blockage of the tire and wheel. When this series of tests is completed similar field tests with other high speed military aircraft will be undertaken.

New Picco Plant in Operation

► The new West Elizabeth, Penna., plant for production of hydrocarbon resins and aeromatic solvents has been placed on stream by the Pennsylvania Industrial Chemical Corp. of Clairton, Penna. The new facilities will supplement the company's other plants at Clairton and Chester, Penna., in the manufacture of "Picco" products for paint, rubber and general chemical compounding industries. The highly-automated plant features numerous unique manufacturing techniques and controls. Shipments to and from the plant, which is on the Monongahela River, will be made by rail, truck and barge.

Canadian News

► The first of a series of rubber statistics to be issued by the Rubber Association of Canada indicate that Canadian consumption of rubber is expected to decrease in the first six months of 1958, compared with the same period last year. The final six months of the year will probably show a more favorable comparison, the report said, and the over-all result is expected to show a reduction of less than two per cent for the year.

In 1957, member companies, accounting for about 90 per cent of total Canadian consumption, used 80,146 long tons of new rubber, the second highest level on record, compared with 83,711 tons in 1956. Consumption is estimated at 39,354 tons in the first six months this year compared with 43,529 tons in the first half of 1957 and 39,420 tons in the second six months, compared with 36,617. The year's total consumption should amount to 78,774 tons.

In spite of recent decreases which have lowered the prices of several commonly used grades of natural rubber to more or less parity with the price of synthetic rubber, association members expect to use proportionately less natural rubber in 1958 than in 1957. Percentages are expected to be 44.6 per cent of natural rubber compared with 46.6 per cent in 1957 and 55.4 per cent of synthetic compared with 53.4. The first tire figures, made up from all Canadian tire producers, show that production of pneumatic tires (excluding bicycle tires) in 1957 was 7,868,464 units, second highest on record, compared with 8,327,117 units in 1956. Production of passenger car tires was 6,634,641 units, slightly below 1956 production of 6,896,863 units. Total sales of passenger car tires were 6,594,656 units compared with 6,475,273.

► W. Horace Mason has been elected president and general manager of the Seiberling Rubber Co. of Canada, Ltd., succeeding Marcus L. Brown. Formerly vice-president and treasurer of the company, Mr. Mason also will continue as treasurer. Mr. Brown, whose retirement as president and general manager became effective April 1, will continue as a director of the company. H. P. Schrank, executive vice-president of the Seiberling Rubber Co., Akron, Ohio, the parent company, will become a board member.

Mr. Mason was born in England and came to the United States at the age of six. Educated here, he joined Seiberling in 1926 and held various accounting positions until he went to Canada in 1952 as secretary-treasurer and director. He is a member of National Association of Cost Accountants.

Other officers elected at the organizational meeting following the annual meeting were A. P. Acheson, vice-president in charge of sales; A. L. McMullen, vice-president in charge of production; C. E. Jones, vice-president, and D. N. Morris, secretary and controller. In addition to Mr. Brown and Mr. Schrank, directors re-elected were Mr. Mason, Mr. Acheson, Mr. McMullen, J. P. Seiberling, Mr. Jones, president and vice-president respectively of the parent company, and M. C. Deans, president of Bankers Bond Corp.

► British and Indian interests, opposing higher protective tariffs for Canada's rubber footwear industry, said recently that Canada should remember that trade is a two-way street. In a brief presented to the Canadian Tariff Board on behalf of the Rubber Footwear Manufacturers Association in the United Kingdom, G. E. Somerfield said imports of British rubber footwear into Canada are small but they do earn dollars. He said "The United Kingdom's ability to buy from Canada is dependent upon our over-all dollar position."

The Canadian Rubber Association, representing six Canadian manufacturers of rubber-soled canvas footwear and rubber boots and overshoes, is asking higher duties on imported competing footwear. These imported goods, it says, will lead ultimately to the industry's extinction. Tariff board chairman, H. B. McKinnon, said that since the industry still holds more than 90 per cent of the Canadian market for rubber footwear, its rate of extinction seems to be extremely slow. The industry seeks minimum specific duty increases ranging from 55c to $1.35 on rubber footwear. The only change it asks in the present ad valorem schedule is the addition of a 20 per cent duty on British rubber boots and shoes, which now enter Canada duty free.

► Du Pont Co. of Canada (1956) Ltd., has announced that in 1957 the company established a new record in sales, although earnings showed a decrease compared to those of the previous year. Net income of $4,491,000, which is subject to audit, was equivalent of 60c a common share, seven cents less than the previous year on earnings of $4,969,000. Sales last year were $72,635,000, nine per cent more than $66,606,000 in 1956. Profits from the additional sales volume were more than offset in the second half of the year by the heavy expenses of the initial operation of new units in the diversification program, the company states. Expenditures on plant construction totalled $14,654,000 during 1957 as two large plants were completed and important expansions of existing plants were underway.

► Courtaulds (Canada) Ltd. has announced a reorganization of the Sales Development and Technical Service Departments into a unified Marketing Division under J. A. Dixon, formerly general sales manager, as general marketing manager. The company said the reorganization had been made in order to place under one control all aspects of marketing of the company's products, which include viscose staple fiber, high tenacity yarns and textile filament yarns. Customer service, sales development, advertising and merchandising as well as direct sales have been included as functions of the new Marketing Division.

► Eric E. S. Campbell has been named technical sales representative for rubber chemicals by the Naugatuck Chemicals Division of Dominion Rubber Co., Ltd., Montreal, Ont. With headquarters located at the Naugatuck general offices in Elmira, Ont., he will service the central Ontario area. Mr. Campbell holds a B. S. Sc. in chemistry and zoology from the University of British Columbia. Following his graduation, he was with the International Pacific Salmon Fisheries Commission, after which he entered the army. Mr. Campbell joined Naugatuck after his discharge from the service.

► Chemicals Division of Canadian Industries, Ltd., has announced the appointment of H. G. Campbell, formerly assistant sales manager, as sales manager succeeding Gordon D. Pratt, who will serve as a sales consultant. Born in Pelly, Sask., Mr. Campbell received his early education in Saskatchewan and was graduated from Queens University with a B. Sc. degree in civil engineering. He joined C-I-L as a chemist in 1935 and since then has held several administrative posts with the Chemicals Division at Hamilton, Cornwall, Ont., Toronto and Montreal.

► Diamond Alkali Inter-American Corp., New York, N. Y., has appointed Alexander D. St. Clair as Canadian sales representative. Mr. St. Clair was formerly associated with the Natural Products Corp. in Montreal as product sales manager and previously, he was purchasing agent for Chipman Chemicals, Ltd. A native of England, Mr. St. Clair was export manager of Plant Protection, Ltd., London, from 1946 to 1950. He attended Pembroke College, Oxford University, from 1938 to 1940, when he joined the Royal Artillery. He is presently a captain in the Canadian Militia.

► Douglas G. Sinclair, sales manager of Rubbermaid (Canada) Ltd., has been elected to the board of directors of the company. As sales manager, Mr. Sinclair has been in charge of a sales program intended to give the company's Canadian products the same wide degree of distribution the Rubbermaid line of houseware and automotive accessories products now has in the United States. A native of Toronto, Mr. Sinclair was graduated from Upper Canada College in 1940 and has also studied at Toronto University.

► Gutta Percha and Rubber Co., Ltd., has signed an agreement whereby employees laid off after June 15th will receive at least 65 per cent of their take home pay including unemployment insurance. The plan, evolved by the company and Local 136 Rubber Workers of America, allows for six months of such relief payments to employees who have served with the company for one year.

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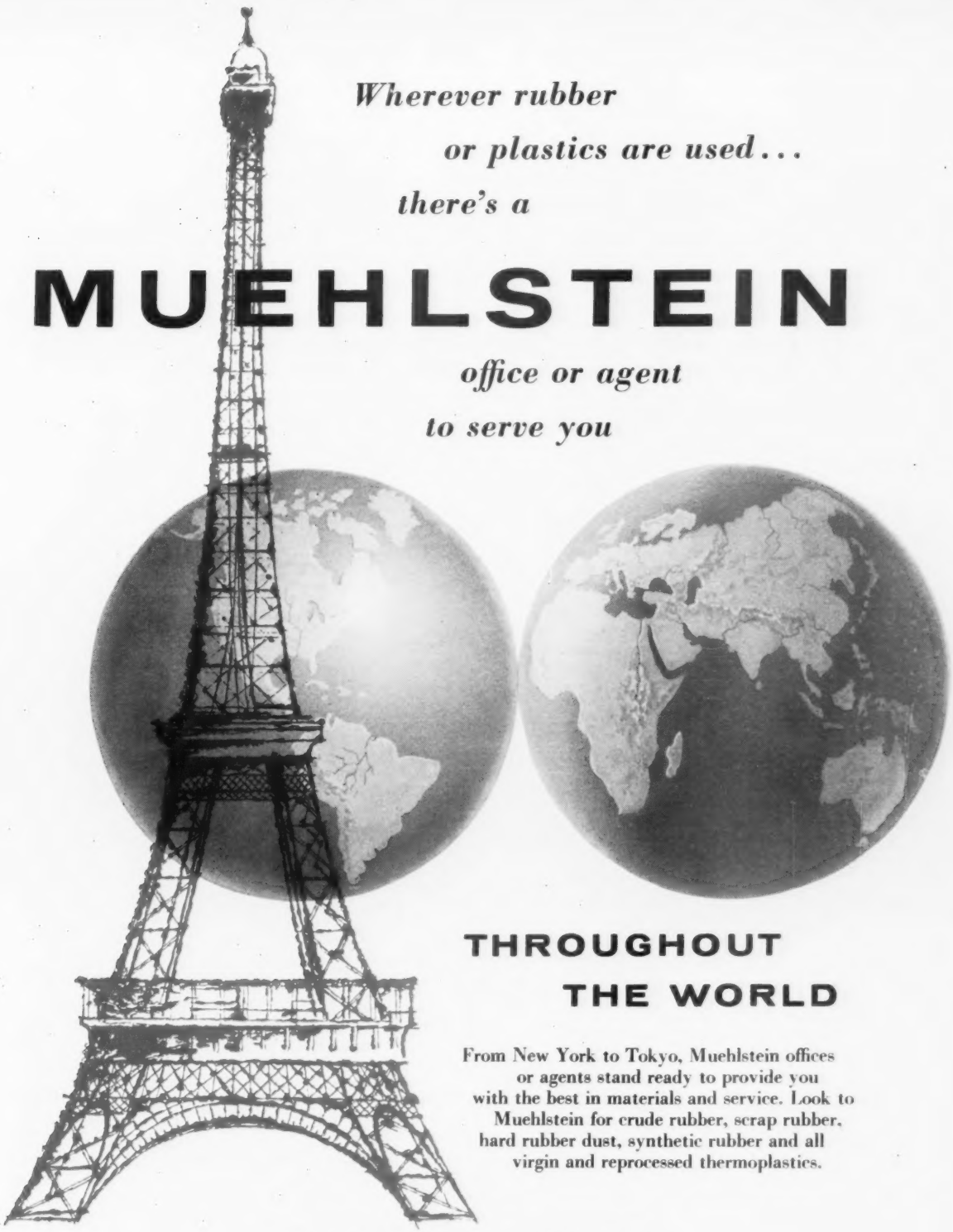

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Obituaries

Louis J. Schott

► Louis John Schott, chairman of the board of the L. J. Schott Co. and a pioneer in the rubber industry, died on Friday, February 28, at Akron General Hospital after a long illness. He was 72 years old. Born in Akron, Mr. Schott was the son of Louis Schott, owner of Schott's Mill, in that city. Later, he was vice-president of the Schott Milling Co. Associated with the rubber industry for many years, Mr. Schott was one of the early employees of the Firestone Tire and Rubber Co. He was also an employe of the old Swinehart Rubber Co. and the Marathon Rubber Co. Mr. Schott was instrumental in the organization of the Amazon Rubber Co., and was its president, and also was an organizer and president of the Northern Rubber Co. He decided to become a manufacturer when he saw the rubber business expanding with enormous shipments of its products over the railroads. In the 1930's, Mr. Schott organized the L. J. Schott Co., jobbers in fabrics and textiles. At the time of his death, he was board chairman. He is survived by his wife and two sons.

Robert L. Hutchison

► Robert L. Hutchison, vice-president in charge of operations and a member of board of directors of the Columbia-Southern Chemical Corp., Pittsburgh, Penna,, died on March 21 as a result of an automobile collision. He was 54 years old. Mr. Hutchison joined the company as a draftsman at the Barberton, Ohio, chemical plant. There he held various positions in the Experimental Engineering Department, serving as superintendent of the plant from 1940 to 1947. He was transferred to the general office in Pittsburgh in 1947 as general superintendent for the company and later became general manager of operations. Mr. Hutchison was elected a vice-president and director in 1955. A native of Aberdeen, Scotland, he was educated at Gordon's Technical College at Aberdeen. He is survived by his widow, one son and two daughters.

Fred O. Reedy

► Fred O. Reedy, president of the Kennedy-Van Saun Manufacturing and Engineering Corp., Danville, Penna., died on February 24 at the Geisinger Memorial Hospital in Danville following an operation. He was 66 years old. Mr. Reedy was a production engineer for the American Car and Foundry Co. before joining Kennedy-Van Saun in 1920 in the same capacity. He became a vice-president in 1942 and president in 1955. Mr. Reedy was a director of the Danville National Bank, the Danville Chamber of Commerce, the Philadelphia Post of the American Ordnance Association and a member of the National Advisory Commission on Munitions.

Paul L. Swisher

► Paul L. Swisher, vice-president and a member of the board of directors of Reichhold Chemicals, Inc., White Plains, N. Y., died suddenly of a heart attack on March 9 at Phelps Memorial Hospital, North Tarrytown, N. Y. He was 59 years old. Mr. Swisher was born in Marion, Ind., and was prominent in advertising and paint manufacturing circles for many years. He joined Reichhold Chemicals in 1934 as advertising and sales manager and was elected vice-president four years later. He became a member of the board of directors in 1949. He was a Past Master of Portage Lodge, No. 675, F. & A. M., South Bend, Ind.; a member of the South Bend Consistory, the Oak Shrine in Hammond, Ind., and the Grotto of Canton, Ohio. He was a graduate of Bryant & Stratton Commercial School, Boston, Mass., and the Cleveland Ad-Club School of Advertising. Mr. Swisher is survived by his wife, two sons and a daughter.

Carl F. Lindholm

► Carl F. Lindholm, president of the Independent Die & Supply Co., St. Louis, Mo., and the New Era Die Co. of Red Lion, Penna., died in St. Louis on March 7. He was 66 years old. He came to St. Louis with his father in 1905 to start the St. Louis branch of the original Independent Die Co. of Brockton, Mass. The company name was changed to Independent Die & Supply Co. and incorporated under the laws of the State of Missouri in 1927 when it was separated from the Brockton firm. Mr. Lindholm is survived by his wife and two daughters.

Fred Siddall

► Fred Siddall, a director of Francis Shaw & Co. Ltd., Manchester, England, died at his home in Sale, Cheshire, on February 17. He was 72 years old. He joined the company when he was 18 and through the years came into contact with many of the leading engineers in the industry. In 1944, he was appointed a director of the company. He travelled extensively throughout Europe, Malaya, India, Indonesia and the U.S.A. where he had contacts with the leading authorities on rubber working machinery. Mr. Siddall is survived by his wife and a daughter.

Hugh L. Huffman

► Hugh L. Huffman, purchasing agent for the Robbins Floor Products, Inc., died February 10. He was 54 years old. A native of Normandy, Tenn., he had been employed by the Robbins Co. for the past 12 years and was appointed to the position of purchasing agent in 1953. He participated in civic activities in Florence, Ala., and served in several official capacities with the Lions Club over a period of years. Mr. Huffman is survived by his wife, two daughters and a son.

Elmo E. Hanson

► Dr. Elmo E. Hanson, research physicist for the Firestone Tire & Rubber Co., died unexpectedly at his home in Akron on March 9. He was 51 years old. Dr. Hanson pioneered Firestone's work on bullet-sealing fuel cells and held several patents on them. Born in Sunburg, Minn., Dr. Hanson received his bachelor's degree from St. Olaf College and a doctor's degree in experimentative physics from the University of Minnesota, before coming to Akron and joining Firestone in 1938. He was a group leader in Firestone's physics group of the Chemical and Physical Laboratory. Dr. Hanson was a member of the American Chemical Society and its Division of Rubber Chemistry, the American Association for the Advancement of Science, American Institute of Physics, Ohio Society of the American Physical Society, and the Cleveland Physical Society. He is survived by his wife, a son and daughter.

George P. Lyder

► George P. Lyder, retired manager of the Retail Tire Division of the Socony Mobil Oil Co., Inc., died on March 5 while visiting friends in New York City. He was 65 years old. He had worked for the Seiberling Rubber Co. and the Goodyear Tire & Rubber Co. before joining Socony Mobil in 1946. He was an Air Force Veteran of both World Wars, with a reserve rank of lieutenant colonel. He is survived by his wife and two daughters.

Frederick W. Frerichs, Jr.

► Frederick W. Frerichs, Jr., retired chief chemist of the Cupples Co., Manufacturers, St. Louis, Mo., died on February 18. He was 70 years old. He graduated from Washington University with a B.S. degree in chemistry before joining the Cupples Co. in 1919. Mr. Frerichs retired from Cupples on December 31, 1952. He is survived by a son and six grandchildren.

Two OTS Reports Released

► Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C., has released two new reports, the first of which is entitled *Inert-Atmosphere Chamber for Chemical Operations*, by D. L. Herring, U. S. Naval Ordnance Laboratory. This report describes an inert-atmosphere chamber, called a "dry box", which was designed and constructed for handling nonvolatile chemicals which are sensitive to moisture and/or oxygen used in research on modified inorganic polymers. Report PB 131067, published in January, 1956, consists of 28 pages and is priced at 75c. The second report, *Infrared Absorption Studies of Some Halogenated Acetic Acids*, by R. E. Kagarise, Naval Research Laboratory, is a 50 page study of infrared absorption of eight halogenated acetic acids in the 2 to 15 micron region for the liquid and crystalline states. Published in August 1957, Order PB 131035 is priced at $1.25.

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New Goods

Beebe Ripple Soles

► "Ripple Soles," introduced by the Beebe Rubber Co., Nashua, N. H., are said to be bringing about a new mode in walking comfort by effectively absorbing heel shock, a primary cause of foot fatigue. Ripple soles are in the form of inverted V's angled rearward and are molded from Plioflex. According to Beebe, shoes made with

Ripple Soles increase the stride by several inches. As the foot is placed down, the resilient V's are depressed, promoting a gliding action and producing a softening underfoot. The depressed V's are released as the foot is lifted and propel the shoe forward. The company states that body balance and correct posture are assisted by these soles as weight is distributed over the entire foot. The multiple, non-skid V's grip wet surfaces, providing good traction, and have proved helpful in climbing grades. Ripple Soles are produced in brown, red, black and white. Oil-resistant type soles for industrial safety use are also manufactured by Beebe, company officials state.

Lord Trailer Spring

► Lord Manufacturing Co., Erie, Penna., has introduced a new-type bonded rubber spring for suspension systems in boat and utility trailers which is said to make possible cost and weight reductions. Providing better shock protection than conventional suspensions, the spring is of a special shear sandwich construction with a rubber flexing element permanently bonded between two metal plate assemblies. It attaches between the axle bracket and the trailer frame and eliminates the sway brace now used on most conventional suspensions. The suspension, which can be adapted to all makes of trailers, is said to provide good stability, multi-directional cushioning and inherent damping so that no auxiliary snubbers are needed. Parts available from stock can be used for trailers from 300 to 2000 pounds capacity.

Grex Polyethylene Nose Guard

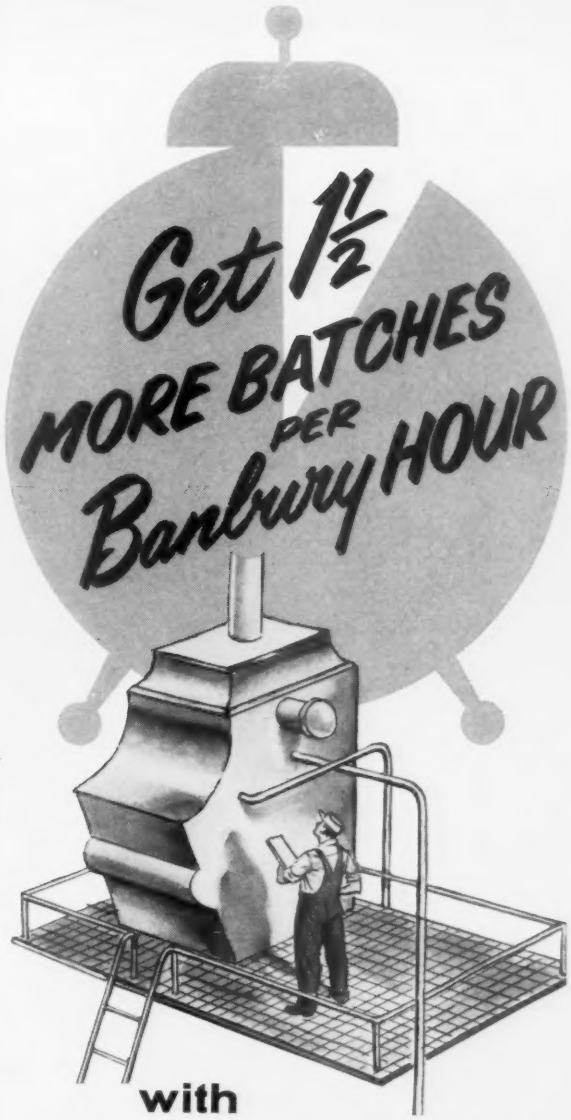
► Kusan Plastics of Nashville, Tenn., is manufacturing plastic nose guards for football helmets from a new high density polyethylene, called "Grex", which is said to have high impact strength and light weight. According to Kusan Plastics, performance tests in which the nose

guards are subjected to blows more severe than those encountered on the football field demonstrate that they will not break in use. Grex polyethylene, produced by W. R. Grace & Co., gives slightly under impact but resumes its original shape.

PowerGrip Flexible Coupling

► A new positive dry coupling that never requires lubrication has been developed for troublesome power transmission conditions by the U. S. Rubber Co. of New York, N. Y. Named "PowerGrip," the flexible coupling is made up of three component parts: a heat- and oil-resistant neoprene sleeve with axially-molded internal teeth and two metal end-fittings with grooves that match the sleeve's teeth. Neoprene sleeves are reinforced with high capacity textile fibers in larger-size couplings. Simplicity of design in the new coupling is reflected in the low initial cost and maintenance charges. Installation can be made "by eye" shaft-alignment without precise, micrometer measurements.

Over-all length of the coupling can be varied simply by increasing the length of the sleeve section as design requirements are modified or machinery is shifted. The sleeve's neoprene teeth are designed to move easily and positively in the grooves of the end-fittings, eliminating metal-to-metal contact and the need for lubrication. PowerGrip flexible couplings are manufactured in two basic hub sizes with two-, four- and six-ply rubber variations to increase torque capacity for each hub size. These six units satisfy standard requirements for loads up to 40 horsepower at 1750 rpm or torque loads up to 1440 inch-pounds.



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Inflatable Construction Air Bag

► A giant inflatable rubber bag for use in the construction field, has been developed by B. F. Goodrich Aviation Products Co., Akron, Ohio. The new product raises the roofs and lowers the floors of demountable homes. The deflated air-bag is positioned under the roof sec-

tion and inflated with a conventional air compressor, raising the roof as it inflates. With the raised roof supported by props, the bag is allowed to deflate. According to the company, the entire process can be performed by two men in six minutes. The bag is manufactured from fabric coated with a special synthetic rubber that is said to resist abrasion and the effects of extremely high and low temperatures, petroleum products and mildew. Inflated, it measures 11 feet in diameter and 15 feet in length. The bag weighs 90 pounds and folds into a package 36 x 36 x 15 inches. Deflated, it covers approximately 300 square feet.

Kemi-Kleen Cloth

► A non-woven fabric named "Kemi-Kleen Cloth" that is chemically treated to pick up dust and dirt particles has been introduced by Lowndes Products of Philadelphia, Penna., manufacturer of non-woven cleaning and wiping cloths for the U.S. Navy. The fiber dispersion process employed by Lowndes furnishes uniform multi-directional strength and excellent durability. Principal ingredient of the bonding formulation used is Chemigum latex. Minute pockets formed by the web-like structure of the chemically treated cloth pick up and trap dust and dirt particles on contact. The dust pick-up formulation is carefully controlled and leaves no harmful residue on rugs, floors, furnishings or industrial equipment the company states.

Textractor and Texroc Rolls

► Two new textile rolls to be used in extracting liquids on dye and bleachery operations, have been named "Textractor" and "Texroc" by the Manhattan Rubber Division of Raybestos-Manhattan, Inc., Passaic, N. J. Used in extracting liquids on mangles, mercerizers, wringers and ranges, they work efficiently as a pair but either roll may be used separately to suit the installation. Manhattan Textractor rolls are reported to be more crack-resistant and to extract more water than conven-

tional rubber covered rolls, and the cushion-like nip prevents crushing. Cloth crushing as usually experienced with ordinary rolls is eliminated. Manhattan Texroc rolls are entirely new types of hard white rubber rolls that extract up to 10 per cent more water than metal rolls, minimize chemical and dye build-up and eliminate pitting. The manufacturer claims both permit maximum and uniform edge-to-edge water removal and have longer roll life.

Riegel Coated Gloves

► A complete new line of neoprene, vinyl plastic and rubber coated work gloves has been introduced by the Industrial Glove Division of the Riegel Textile Corp., 260 Madison Ave., New York 16, N. Y. The neoprene

gloves are said to be liquid-proof, to resist acids, solvents and caustics and to be suitable wherever heat, snagging or cutting are a danger. Riegel states that the fully-coated vinyl plastic gloves are 3 or 4 times more effective against oil than ordinary plastic gloves, protect against solvents and abrasives and offer superior finger dexterity and improved hand comfort. A positive grip and excellent resistance to cutting, abrasion, heat and punctures are outstanding properties of the natural rubber coated group, the company states.

Multi-Link Mat Introduced

► A new oil and greaseproof multi-link mat that provides safe non-skid footing for industrial floors has been announced by the B. F. Goodrich Industrial Products Co., Akron, Ohio. Conventional mats have unsatisfactory service life when exposed to the effects of petroleum products. The multi-link matting is custom-made with links strung on parallel non-rusting spring steel rods. Links, nosing and edging are made of the same oilproof material and available only in a brown color.

An editorial index to Volume 82 of RUBBER AGE appears on pages 201-204 of this issue.

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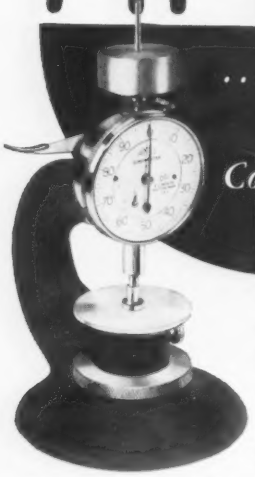

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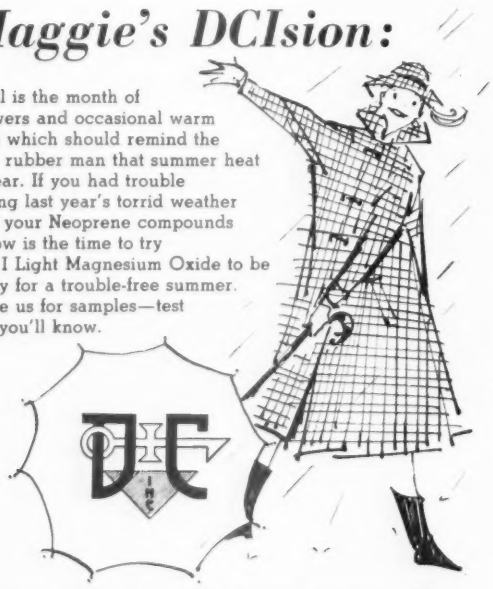

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New Equipment

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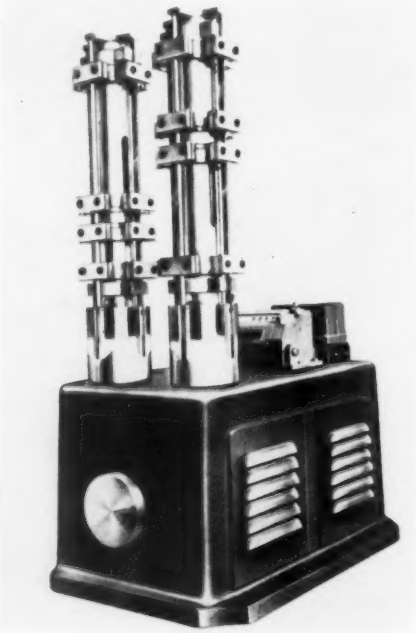
► A new type machine for flex-cracking and cut-growth tests of rubber and plastic materials, made by Zwick & Co., Einsingen, West Germany, enables tests conforming to ASTM and other specifications and standards. It is of twin-column design for testing 16 specimens simultaneously. The motor is of constant speed, is capable of 300 flexing cycles per minute, has an eccentric stroke setting of from 0 to 100 mm. cycle counter, with automatic cut-off to stop the machine after 1000, 3000 or 5000 flexing cycles. This tester can be used for extension cracking also when a total tensile load of up to 50 pounds can be applied to four specimens. Details are available from William J. Hacker & Co., Inc., 82 Beaver St., New York 5, N. Y.

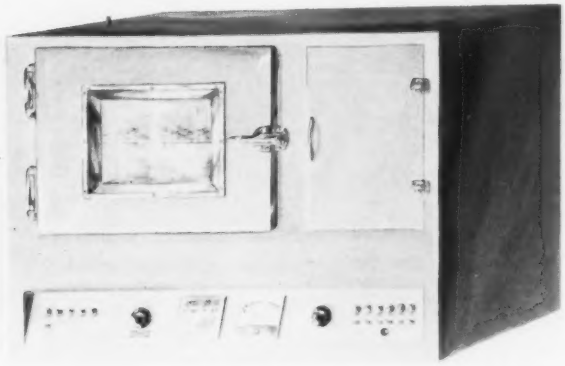


Taylor Volumetric Differential Pressure Transmitter

► The Taylor 205-T volumetric differential pressure transmitter was designed for the purpose of simplifying difficult flow and liquid level measurements, such as corrosive fluids, liquids that jell when not in motion, colloidal suspensions and slurries. Its use is said to provide a standard instrument that eliminates a wide variety of costly special installations and the maintenance of winterized lead lines ordinarily required between transmitter and process. No added installation problems are encountered for use with viscose, liquid sulfur, sulfuric or HF acid. The instrument also measures differential pressures on fractionating columns, pumps and filters. It is manufactured by Taylor Instrument Companies, Rochester 1, N. Y.

OREC 0300 Ozone Test Chambers

► OREC 0300 series ozone test chambers featuring an entirely automatic control system has been announced by Ozone Research & Equipment Corp., 3861 West Indian School Road, Phoenix, Ariz. Each unit is provided with a panel meter for directly reading ozone concentration in pphm/volume when selecting a desired ozone concentration in the cabinet. The ozone test chambers are said to operate continuously on a 24 hour schedule without the need for laboratory attendance. For



use at any ozone concentration it is necessary simply to turn one dial to set the panel meter at the desired concentration. Because of the automatic control system, ozone concentration is said to be constant without regard to the number of samples in the chamber and the rate at which samples ozonize during test. OREC 0300 is designed to conform to ASTM D-1149-55T and all known ozone test specifications for the accelerated ozone cracking of rubber and other elastomeric vulcanizates, and to provide the ozone concentrations required by ASTM D-470-54T, D-1352-54T, D-1373-55T and IPCEA Wire and Cable Tests. OREC 0300 series specifications include the following: Bench model, 48 inches wide by 36 inches high x 25 inches deep; temperature range, 5°F. below ambient to 200°F. with ±1°F. Power-O-Matic temperature control; air circulation velocity over samples, 2 feet per second; air flow through chamber, up to 2 chamber changes of freshly ozonized air per minute; power requirements, 100-120 volts, 60 cycles, AC (Integral 115 volt constant voltage regulator); exterior finish, pastel blue hammerloid enamel with all chrome hardware; interior, entirely stainless steel.

Gross Pipe Jacket

► The Gross pipe jacket, manufactured by F. R. Gross Co., Inc., P. O. Box 2044, Akron 11, Ohio, is designed to heat or cool a pipe around which it is placed. It is said to be easily installed without welding. Other advantages claimed for the pipe jacket are high heat transfer rates, economical use of water, easy mobility, low cost, and anti-corrosion construction. The jacket is used for cooling water up to 80 pound pressure.

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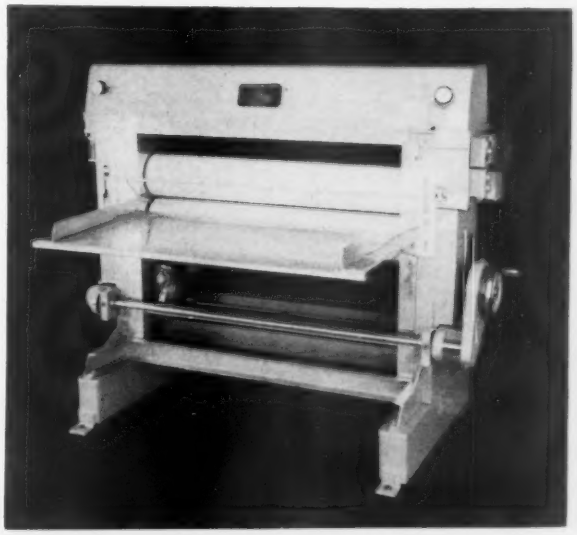

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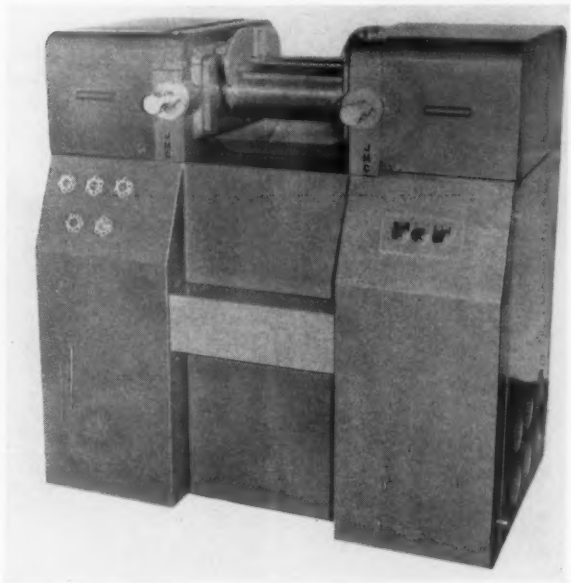
JMC Laboratory Mill

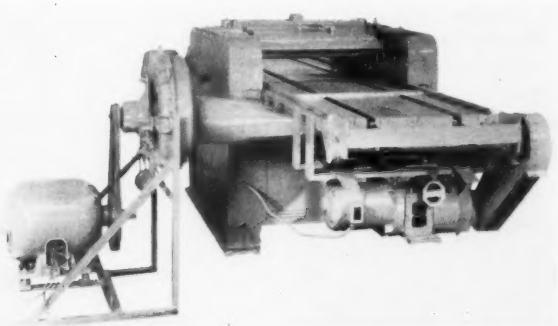
► The JMC two-roll 6 by 13 inch laboratory mill has 4 inch diameter journal necks which, according to the manufacturer, JMC, 683 Frelinghuysen Ave., Newark,



N. J., are the largest used on this type machine. Other features are hardened and ground steel rolls, cast steel top frames, forced feed lubrication, micrometric roll adjustments, calibrated indicators and 7½ hp geared motor.

Buss Micro-Surfacer

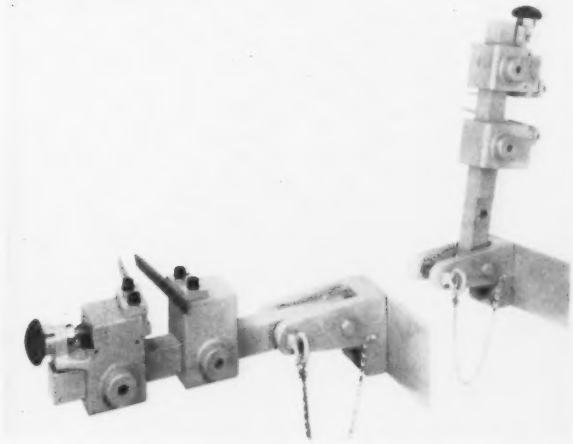
► Buss Machine Works, Holland, Mich., has recently added to its line of micro-surfacers a high speed sizing machine for tolerance planning of plastic blocks or sheets and flat extruded, laminated or pressed materials. Ad-



vantages claimed for the machine are that stock can be sized at considerably higher feed rates in one pass, and that the high velocity of the cutters allows machining of thermal plastics without melting them. The rigidity of the large cutter head and carbide knives is said to permit very dense materials to be machined which previously could only be sized by grinding or sanding.

Goodman Rubber Mill Strip Cutter

► Two features of a new rubber mill strip cutter manufactured by G. F. Goodman & Son, 401 Richmond Street, Philadelphia 25, Penna., are a micrometer control and a swing back mount. The former is said to offer precise



control over stock widths by means of a knob graduated in increments of .015 inch, and the latter to allow the attachment to be moved back to a safe position when it is not in use. The unit can be mounted on 42, 48, 54 or 60-inch two-roll rubber mixing mills. The toolsteel blades are hardened to Rockwell C 35-40, can be sharpened with a file or bench grinder, but are not hard enough to cut mill rolls. An extruder may be strip-fed directly from the warm-up mill with this attachment and a simple overhead conveyor.

Shore A-2 Durometer with Tolerance Hands

► Newly introduced by Shore Instrument & Mfg. Co., Inc., 90-35 Van Wyck Expressway, Jamaica 35, N. Y., is its model A-2 durometer with tolerance hands. The

two red hands may be set by knurled knobs to show acceptable limits, or range, and are of visual assistance where a large number of parts in a specific hardness range are to be tested. The instrument is supplied in a mahogany case which measures 6 x 4½ x 1⅝ inches.

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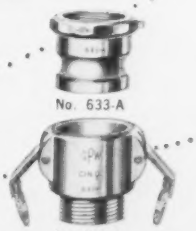

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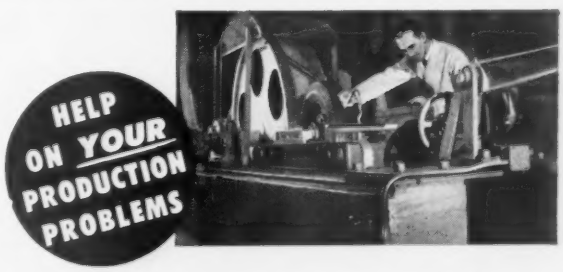

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Further details are easily obtained by writing to:

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Reviews

BOOKS

Ebonite: Its Nature, Properties and Compounding. By J. R. Scott. Published by MacLaren & Sons, Ltd., 131 Great Suffork St., London S.E., England. 5½ x 8¾ in. 294 pp. Price: In England 50s; In U. S. and Canada $8.00.
(Available from Book Department, RUBBER AGE)

Ebonite, or hard rubber, possesses a combination of properties which has caused it to find many industrial applications. Despite certain shortcomings—notably the necessity for lengthy cures, tendencies toward discoloration and loss of electrical insulating properties on exposure to air and light, and the property of softening and deforming at high temperatures—it has continued to be an important material in many fields.

It was the need felt for improved hard rubber vulcanizates that provided the stimulus for the investigations whose results are summarized in this book. In 1931 the Research Association of British Rubber Manufacturers issued a memorandum detailing a program of cooperative research to be conducted by R. A. B. R. M., British Electrical and Allied Industries Research Association and the Ceylon Rubber Research Scheme on hard rubber, with particular attention to means of improving its surface stability and resistance to "plastic yield" at high temperatures without sacrificing electrical properties.

The object of the present volume is to bring together the main facts of the scattered mass of information produced by this research, and, where necessary, to rediscuss the results in light of present knowledge, and by presenting this information to aid the manufacturer in compounding and vulcanizing his product to give the best service. In particular, the fundamental nature of "plastic yield" and the factors which control it, and surface deterioration in light and its dependence on compounding and other variables, are analyzed.

The chapter titles of the book indicate its scope: (1) What is Ebonite?, (2) Heat Evolution During Cure, (3) Surface Deterioration in Light, (4) Resistance to Swelling by Liquids, (5) Time of Cure, (6) Temperature of Cure, (7) Method of Curing, (8) Rubber-Sulfur Ratio, (9) Use of Purified Natural Rubber and Gutta-Percha, (10) Organic Accelerators and Metallic Oxide Activators, (11) Mineral Fillers—General, (12) Silica Fillers, (13) Ebonite Dust, (14) Softeners, (15) Reclaimed Rubber, (16) Synthetic Rubber Ebonites and (17) Recommendations on Compounding and Curing.

Three appendices follow the text: (1) Test Methods, (2) Bibliography, listing the original reports and papers resulting from the Joint Ebonite Research, and (3) Literature References, a list of other relevant books and articles. An extensive subject index closes the volume, will be a basic work for many years.

•

Emulsions: Theory and Practice. By Paul Becher. (ACS Monograph No. 135). Published by Reinhold Publishing Corp., 430 Park Avenue, New York 22, N. Y. 6 x 9 in. 382 pp. $12.50.

This book is an essentially self-contained discussion of modern emulsion theory and practices, with particular attention to the developments of the last 15 years. It begins with the facts and theories of surface chemistry relevant to emulsions and the physical properties of emulsions as a function of emulsion composition. Next, the theories of emulsion stability and manifestations of instability (such as inversion, creaming and complete demulsification) are covered. The volume also contains discussions of the chemistry of emulsifying agents, emulsifier efficiency as a function of composition, and the technique of emulsification, including various types of emulsators. It offers practical formulation information on numerous emulsion types, and describes the commercial aspects of demulsification. Two useful appendices deal with the measurement of emulsion properties and commercially available emulsifying agents.

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Industrial Chemicals. (Second Edition). By W. L. Faith, Donald B. Keyes and Ronald L. Clark. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. 6 x 9¼ in. 844 pp. $16.00.

This valuable book, first published in 1950, has now been revised to reflect the tremendous changes undergone by the chemical industry since the publication of the first edition. These include, for example, the appearance of new chemicals of industrial importance, such as polyethylene and the diisocyanates; growth in production of certain chemicals, such as acrylonitrile which has increased 700 per cent, and effects of such factors as the sulfur shortage during the Korean War which has influenced drastic changes in the technology of aromatic hydrocarbons.

To present a well-rounded survey, the authors have added 35 chemicals to the original 106, and have dropped one. Each chemical is treated in a separate chapter, which supplies information on how it is made, how it is used, how much has been produced each year for the past 20 years, important chemical and physical properties, grades, how it is packaged and shipped, who makes it and where, and important economic trends.

In general, the format of the first edition has been followed. All production charts have been changed to cover the years 1935 to 1955; price charts cover 1936 to 1956. Use patterns have been updated as far as possible. The one major change in format is the elimination of maps showing plant locations. These have been replaced by lists of manufacturers with cities in which their plants are located.

A perusal of the table of contents, which lists such materials as acrylonitrile, butadiene, carbon black, stearic acid, styrene and sulfur among many others, emphasizes the pertinency of the subject matter to the rubber technologist.

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Engineering Properties and Applications of Plastics. By Gilbert Ford Kinney. Published by John Wiley & Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 6 x 9¼ in. 278 pp. $6.75.

This book describes the characteristics of plastics. It is written for those who work with plastics and for those who require background information for the proper utilization or specification of these materials. The various plastics are analyzed separately, more or less in order of increasing complexity. A unified treatment rather than a topical approach permits the principles, concepts and terminology to be established for the simpler materials, and is also utilized in the case of the more complex ones. Separate chapters describe methods for fabrication and the mechanical, electrical, optical and thermal properties of the various materials.

The chapter titles indicate the scope of the book: (1) General Nature of Plastics, (2) Polyethylene, (3) Polyvinyl Chloride, (4) Polystyrene, (5) Acrylic Plastics, (6) Other Vinyl-type Plastics, (7) Cellulose Plastics, (8) Phenolic Plastics, (9) Amino Plastics, (10) Polyesters, Polyamides and Epoxies, (11) Silicones, (12) Rubbers, (13) Molding Methods, (14) Engineering Properties, (15) Thermal Properties, (16) Optical Properties, (17) Electrical Properties, (18) Chemistry of Plastics.

A nineteenth chapter is devoted entirely to tables which summarize chemical formulas, general characteristics and typical applications for representative plastics. A subject index concludes the volume.

Emphasis is placed on a fundamental understanding of the nature of plastics, which, the author says may have led to oversimplification in some cases. However, he has achieved one of his aims, which was to organize a tremendous amount of subject matter by selecting pertinent material to illustrate principles. The reader should find the information provided amply sufficent to serve as a guide for detailed study.

Gaps in your library? Contact Book Dept., Rubber Age, 101 West 31st St., New York 1, N. Y.

CONDUCTIVE RUBBER:

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By R. H. Norman

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Special Purpose Machinery for the Chemical and Process Industries. (Bulletin No. PE-5802). H. W. Worth Co., P. O. Box 9051A, Birmingham 9, Ala. 8½ x 11 in. 4 pp.

The various types of mixing, blending and other process equipment manufactured by the company are described in this bulletin. Text and photographs are used to present such items as production size ball and pebble mills, conical dry blenders, conical vacuum dryers and rotary processing blenders, double arm mixing and kneading machines, continuous type mixers and blenders, retractable shell type pressure filters and boltless autoclaves and curing chambers. Sizes are detailed and suggested uses are given. Included is an alphabetical index of all the items produced by the company.

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Buflovak Customer Service Laboratory. (Catalog No. 381). Buflovak Equipment Division, Blaw-Knox Co., 1543 Fillmore Ave., Buffalo 11, N. Y. 12 x 9 in. 10 pp.

A research and testing laboratory for solving problems in drying, evaporation, extraction, mixing, crystallization and other related processes is described in this attractive brochure. The installation—the Buflovak Customer Service Laboratory—is a complete processing plant equipped with small scale experimental units and semi-size plant equipment. The uses of the various machines—including spray dryers, vacuum rotary dryers, drum dryers, forced circulation evaporators, and many others—in solving clients' problems are illustrated with photographs and explained in detail.

•

Kenflex. Kenrich Corp., 57-02 48th St., Maspeth 78, N. Y. 8½ x 11 in. 8 pp.

Properties of Kenflex resins and related products are presented in detail in this technical bulletin. Five solid and five liquid or semi-liquid resins and plasticizers are presented in chart form, with functions and applications specifically designated. Also included are electrical specifications. Kenflex PL, a viscous aromatic processing oil used for improving physicals of wire and cable jackets, extruded hose, gasket stocks and other products, is analyzed, as is Kenflex Processing Aid, a synthetic polymer of aromatic hydrocarbons. Mixing, dispersion, molding and extrusion advantages obtained with the latter are enumerated.

•

Sulfur Dioxide. Ansul Chemical Co., Marinette, Wisc. 8½ x 11 in. 15 pp.

Pointing out that sulfur dioxide is essential to many industries, this publication discusses the chemical at length. Physical properties, specifications, test methods, chemical properties and suggested uses are detailed. Extensive description of toxicity characteristics and treatment procedures is given. Shipping information includes data on containers, sizes and transportation and storage. Uses suggested are as an acidifying and/or neutralizing agent, solvent, antioxidant, anti-chlor, and polymerizing agent, as well as others.

•

Lewis-Shepard Lever: Winter 57-58. Lewis-Shepard Products, Inc., Watertown, Mass. 8½ x 11 in. 16 pp.

Featured in this magazine, which is prepared especially for companies interested in materials handling, are case history stories of the successful application of mechanized materials handling techniques in a wide range industries. Among subjects discussed are palletless handling, palletized shipments and solutions to multi-level handling problems. Two pages are devoted to the attachments available for the company's walkie and rider-type fork trucks.

Dimethylol Phenol Curing System in Butyl Rubber and Effects of Various Activators. (Bulletin No. 100-4). Thiokol Chemical Corp., 780 N. Clinton Ave., Trenton, N. J. 8½ by 11 in. 16 pp.

The purpose of the study reported in this publication is to examine the use of a phenol formaldehyde resin as a butyl rubber vulcanizing agent. Data on a number of important properties, notably outstanding heat resistance, are given. Specific applications in commercial products, including conveyor belts for hot materials, O-rings, heat resistant packings and others, are suggested. Tables are used to present extensive information on the physicals of different stocks, for which formulas are given, and the effects of variations in the constituents.

•

Denison Multipress. (Catalog No. 120-D). Denison Engineering Division, American Brake Shoe Co., 1160 Dublin Road, Columbus 16, Ohio. 8½ x 11 in. 28 pp.

Detailed descriptions of the various operations—including forming, compacting, shaping, stamping, pressing, injecting, slotting, trimming, bending, peening, blanking, pelleting, testing, and molding—of the Denison multipress are given in this attractive publication. Photographs shows the press in operation on the production line. Considerable attention is devoted to special features and auxiliary equipment. A good use of text and schematic diagrams is made in giving a clear picture of the machines and their operation.

•

Toward the Factory of the Future. (Special Report No. 28). American Management Association, 1515 Broadway, New York 36, N. Y. 6 x 9 in. 96 pp. $1.75 (members); $2.50 (non-members).

In addition to reviewing such new dimensions in industry as electronics and atomic energy, this report emphasizes the steps that have already been taken toward automation by leading American companies. A case study provides a detailed description of the introduction of important innovations in this respect in the machine tool industry. Other papers provide a functional breakdown of automation at work, summarizing its impact on maintenance, materials handling, transportation, purchasing and manpower utilization.

•

A-C Polyethylene Lubricant 8407 in a Black-Filled Butyl Rubber Compound. (Rubber Laboratory Release No. 21). Barrett Division, Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y. 8½ x 11 in. 8 pp.

Advantages obtained by using A-C Polyethylene Lubricant 8407 in a black-filled butyl rubber compound are emphasized in this bulletin. General behavior of the lubricant is described, and typical properties listed. Comparative data on physical properties of the stock with no lubricant and at various loadings are given. ASTM test procedures are detailed.

•

Gardner Laboratory Catalogue. Gardner Laboratory, Inc., P. O. Box 5728, Bethesda 14, Md. 8½ x 11 in. 112 pp.

Testing equipment manufactured by Gardner Laboratory suitable for the rubber, plastics and other industries is described in detail in this booklet. Text, diagrams and tables are used to present the extensive data, and each instrument is fully illustrated. The instruments cover the full range used in the rubber industry.

•

Day Type "RJ" Dust Filter. (Bulletin No. G-579). Day Co., 810 Third Ave. N.E., Minneapolis 13, Minn. 8½ x 11 in. 8 pp.

Industrial dust control with the Day "RJ" dust filter is the subject of this booklet. A cutaway view of the filter shows the working parts and explains the filtering principle. Facts on design, efficiency and operation of the unit are included. Dimensions, specifications and illustrations of the five basic types of the unit for a wide variety of dust control applications are given.

Filling a long-felt gap in technical literature

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fundamentals of its science and technology

DR. JEAN LE BRAS
French Rubber Institute
translated by
IRENE E. BERCK, Ph.D.
Editor, Chemical Publishing Co., Inc.

460 pages • illustrated • 1957 • $12.00

This is the first book ever published which thoroughly covers the entire rubber industry, including synthetic elastomers, latices of both natural and synthetic rubbers, and even the pertinent plastics, in less than 500 pages.

It is written especially for the busy rubber chemist and technologist, beginner and student, who have no time to untangle the details they really need from a maze of compiled literature.

Utility is the keynote of the book. With judicious selection from the latest developments in rubber chemistry and physics, theories of elasticity, vulcanization, accelerators, reinforcement, antioxidants, etc., and the most up-to-date procedures of rubber technology and testing, it provides a well-balanced, concise but comprehensive treatise on this vital commodity.

Special attention is given to the principles of selecting the most suitable compounding ingredients to meet the specifications placed on the finished product.

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- Balanced theory and practice
- Instructive illustrations
- Comparative evaluation of natural and synthetic rubbers
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- Time-saving index

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MARKET REPORTS

TRENDS
NEWS
PRICES

Natural Rubber

Since our last report (March 3), the price of natural rubber on the New York Commodity Exchange has moved in a range of 137 points, high for the period being 27.25c reached on March 21, and low being 25.88c reached on March 3. The average price of spot rubber for the month of March was 26.64c based on 21 trading days. This compares with an average of 26.32c in the previous month.

The trade indicates the "uneventful" market for the past few weeks reflects the current indecision in most rubber quarters both in the United States and abroad. Few in the trade see the prospect of any decisive move in the rubber market. The concensus is that another good break in the price structure and a sustained lower level for a period of time would have the effect of stimulating some increase in natural rubber consumption throughout the world.

"Too Much" Rubber Around

Meanwhile, as any number in the trade express it, "there is just too much rubber around looking for takers." A number of rubber interests take the view that it may be a little while before the rubber market assumes an improved undertone. It is quite probable, it is said, that the price structure may be pared considerably from even the present levels.

Analysts at Merrill Lynch, Pierce, Fenner & Smith report that seldom has there seemed to be so much unanimity on the part of all segments of the producing and consuming industry. Were it not for the deteriorated conditions in Indonesia, they state, the rubber price level might be substantially lower than it is.

Ward's Service reports that automobile manufacturers have now reduced their estimates of 1958 production to 4.7 million passenger cars. The number of cars in inventory are said to be approaching the 1 million mark. Generally speaking, this is the worst situation since 1952. Foreign car sales in January, on the other hand, exceeded 5 per cent of our total market for the first time.

In more "normal" times, a situation such as that which now exists in Indonesia would have forced natural rubber prices upwards. Today, however, the market hardly recognizes the Indonesian situation at all. Large dealers have been operating with extreme caution. Likewise, bulk buying has literally ground to a halt, MLPFS reports state.

Course of Future Events

All over the world a mood of "watchful waiting" seems to be developing, with producers and consumers eying each other warily. How soon a break in the situation will develop is problematical. Where natural rubber is concerned, however, the early indications are not too favorable.

RMA reports for February indicate an increase in the synthetic preference ratio. On the basis of statistics available to date, 1958 may see natural rubber consumption in the United States at a figure lower than 500,000 long tons, or the lowest in six years.

NEW YORK, APRIL 1, 1958

Price Data

Closing Rubber Prices on New York Commodity Exchange

FROM MARCH 1 TO MARCH 31

Mar.	Spot	May	July	Sept.	Nov.	Sales
1	....	....	....	....	....	...
2	....	....	....	....	....	...
3	25.88	26.10	26.20	26.22	26.25	134
4	26.00	26.20	26.40	26.50	26.50	142
5	26.25	26.42	26.54	26.60	26.65	54
6	26.38	26.57	26.70	26.72	26.75	49
7	26.25	26.38	26.50	26.57	26.59	19
8	....	....	....	....	....	...
9	....	....	....	....	....	...
10	26.50	26.65	26.73	26.80	26.80	51
11	26.75	26.95	27.01	27.10	27.12	80
12	26.50	26.57	26.70	26.75	26.75	54
13	26.75	26.95	27.01	27.05	27.05	86
14	26.63	26.72	26.80	26.83	26.87	7
15	....	....	....	....	....	...
16	....	....	....	....	....	...
17	27.13	27.20	27.15	27.20	27.30	86
18	27.00	27.05	27.05	27.05	27.10	70
19	26.88	26.80	26.85	26.82	26.82	16
20	27.13	27.00	27.06	27.13	27.11	39
21	27.25	27.34	27.34	27.38	27.35	160
22	....	....	....	....	....	...
23	....	....	....	....	....	...
24	27.00	27.05	27.15	27.15	27.15	23
25	26.88	26.60	26.71	26.75	26.75	91
26	26.50	26.42	26.55	26.60	26.60	58
27	26.63	26.49	26.55	26.60	26.60	22
28	26.50	26.56	26.56	26.56	26.56	5
29	....	....	....	....	....	...
30	....	....	....	....	....	...
31	26.63	26.55	26.65	26.65	26.65	30

Outside Market

No. 1 Ribbed Smoked Sheets:	
Spot	.26⅝
May	.26⅝
June	.26⅝
Thin Latex Crepe:	
Spot	.28⅞
Thin Brown Crepe, No. 2	.23⅛
Flat Bark Crepe	.20

London Market
(Standard Smoked Sheets)

May	27.14 - 27.28
July-Sept.	27.14 - 27.28

Singapore Market
(Standard Smoked Sheets)

May	25.21 - 25.29

Middling Upland Quotations

	Mar. 3	Mar. 31		
	Close	High	Low	Close
May	35.58	36.15	35.98	35.98
July	35.81	36.42	36.22	36.23
Oct.	35.84	36.91	36.70	36.72

Notes & Quotes

H. C. Bugbee, president of the Natural Rubber Bureau, speaking at the recent meeting of the Commercial Chemical Development Association in New York, stated that the rubber producers of Malaya have been standing on their own feet for the past fifty years and "I am confident will continue to do so for the next fifty on the basis of quality and price." Mr. Bugbee pointed out that with close to 3 million people in Southeast Asia directly engaged in the production of natural rubber and perhaps another million deriving their income from ancillary trades, it is desirable and important from a humane and U. S. security standpoint that they prosper and remain on our side. He strongly stressed, however, that this was a matter "for governments to handle."

Synthetic Rubber

The Rubber Manufacturers Association reports that consumption of all types of synthetic rubber in February amounted to 63,520 long tons as compared with January's consumption of 72,625 long tons. Of the total new rubber consumed in February, synthetic rubber accounted for 63.48 per cent, an increase over the January ratio of 63.03 per cent.

Production of all types of synthetic rubber during February in the United States amounted to 81,752 long tons compared with the 102,716 long tons produced in the previous month. If production were to proceed at this pace for the balance of the year, some 1,100,000 long tons would be produced in 1958, or about 150,000 long tons less than in the previous year.

The rise in the synthetic preference ratio in February was not expected by many in the trade in consideration of the generally depressed prices for natural rubber. What is happening, apparently, is that synthetic rubber is taking an increasingly larger share of a smaller total market.

Exports Keeping Pace

Surprisingly, exports of synthetic rubber in the first two months of the current year are keeping pace with the figures established in the first two months of the previous year, about 34,000 long tons in the first two months of 1957 and 35,300 long tons in the first two months of this year. This is taken by some to indicate still another facet of the growing worldwide switch to synthetic rubber.

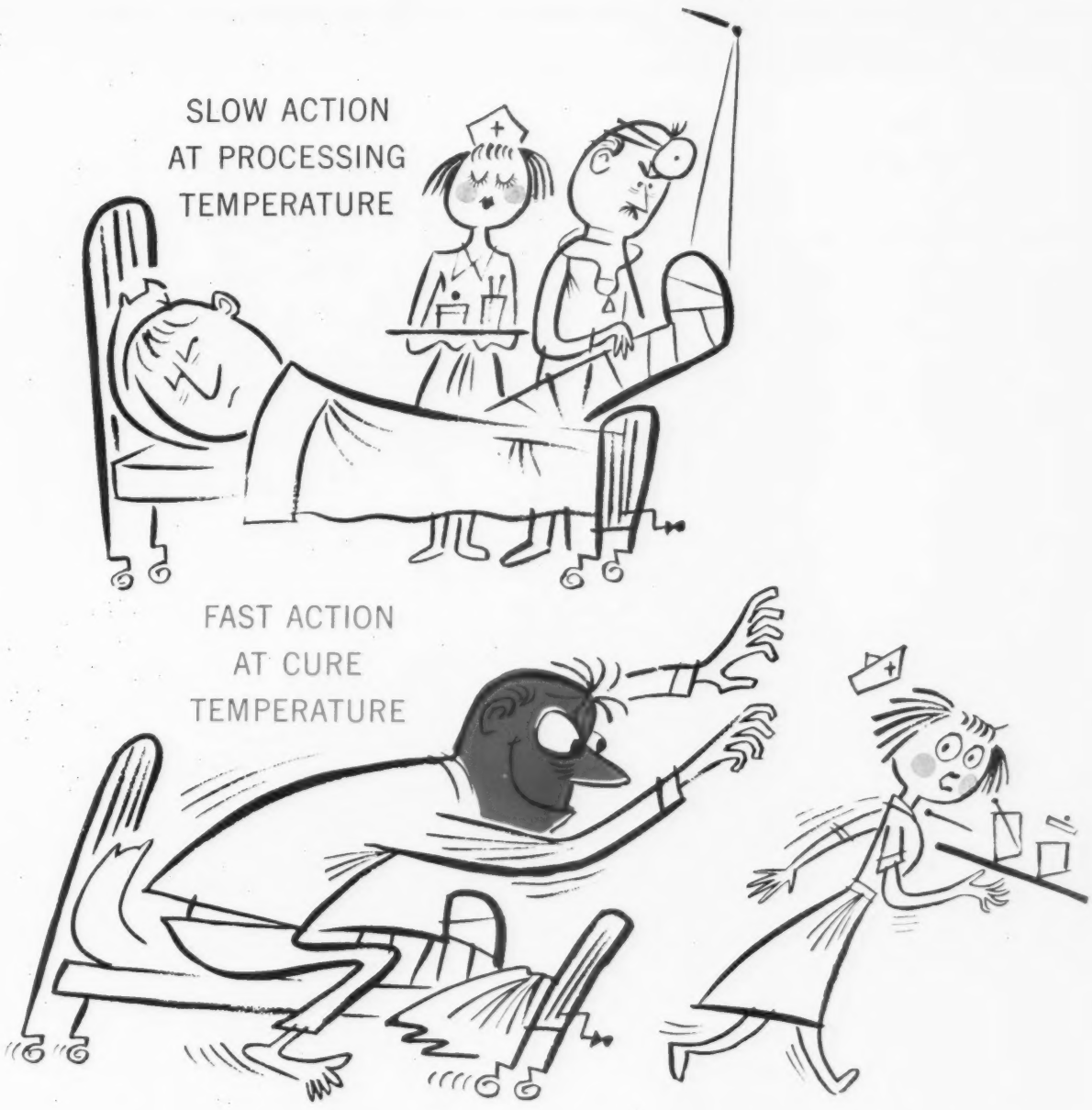
Stocks of synthetic rubber continue to rise and at the end of February, 1958, stood at about 213,000 long tons. At the end of the same month in 1957, stocks totaled 184,800 long tons, while at the end of the year, 201,149 long tons of synthetic rubber were on hand. That stocks continue to rise in the face of falling production is another indication of the lethargy which is obvious in all industrial circles.

The short range view for synthetic rubber parallels that for most other segments of the rubber industry. Since production rates can be set to coincide with estimated consumption, however, the synthetic rubber producer is not nearly so badly off as are others. The fact that the export market continues to grow is an encouraging sign.

Over the long range, the synthetic rubber picture looks very promising indeed. Consider that the gains in the export market are being made at a time when natural rubber, in European markets, is competitive and sometimes priced lower than synthetic rubber.

The Over-All Picture

In consideration of the many favorable factors which surround the synthetic rubber market, many in the trade tend to view reduced production-consumption as a transitory occurence. It is held, in these quarters, that the dominance of synthetic rubber will continue to increase and that synthetic will continue to take an ever-increasing share of an ever-increasing market.



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BOUND BROOK, NEW JERSEY

Slow at processing temperatures, fast at curing temperatures... NOBS delayed-action accelerators are outstanding in providing good cure properties *plus* maximum compounding safety.

Cyanamid's Rubber Chemicals Department has thoroughly evaluated NOBS No. 1 and NOBS Special, alone and in conjunction with activators. The resulting data will provide extremely valuable assistance when you're setting up rubber formulations for optimum processing safety, cure cycles and cure properties.

Request a copy of Technical Bulletin No. 836A, Delayed Action Accelerators.

SALES REPRESENTATIVES AND WAREHOUSE STOCKS: Akron Chemical Company, Akron, Ohio · H. M. Royal, Inc., Trenton, N. J. · H. M. Royal, Inc., Los Angeles, Calif. Ernest Jacoby & Company, Inc., Boston, Mass. · Herron & Meyer of Chicago, Chicago, Illinois · In Canada: St. Lawrence Chemical Company, Ltd., Montreal and Toronto

PRICES OF COMMERCIALLY AVAILABLE SYNTHETIC RUBBER

Dry Rubber

(per pound carload)

Butadiene-Acrylonitrile Types

Butaprene NAA	.5400 [1]
Butaprene NF	.4900 [1]
Butaprene NL	.5000 [1]
Butaprene NXM	.5800 [1]
Chemigum N1	.6400 [1]
Chemigum N1NS	.6400 [1]
Chemigum N3	.5800 [1]
Chemigum N3NS	.5800 [1]
Chemigum N5	.5800 [1]
Chemigum N6	.5000 [1]
Chemigum N6B	.5000 [1]
Chemigum N7	.5000 [1]
Chemigum N8	.5000 [1]
Herecol N-33	.6800 [1]
Hycar 1001	.5800 [1]
Hycar 1002	.5000 [1]
Hycar 1014	.6000 [1]
Hycar 1041	.5800 [1]
Hycar 1042 and 1043	.5000 [1]
Hycar 1312	.5000 [1]
Hycar 1411	.6200 [1]
Hycar 1432	.5900 [1]
Hycar 1441	.6200 [1]
Paracril AJ	.4850 [1]
Paracril B	.5000 [1]
Paracril BJ	.5000 [1]
Paracril BLT	.5000 [1]
Paracril C	.5800 [1]
Paracril CV	.5900 [1]
Paracril D	.6500 [1]
Paracril 18-80	.6000 [1]
Polysar Krynac 800	.5000 [1]
Polysar Krynac 801	.5800 [1]
Polysar Krynac 802	.5000 [1]
Polysar Krynac 803	.5000 [1]

Butadiene-Styrene Types

Ameripol 1000	.2410 [1]
Ameripol 1001	.2410 [1]
Ameripol 1002	.2435 [1]
Ameripol 1006	.2410 [1]
Ameripol 1007	.2425 [1]
Ameripol 1009	.2475 [1]
Ameripol 1500	.2410 [1]
Ameripol 1501	.2410 [1]
Ameripol 1502	.2410 [1]
Ameripol 1703	.2060 [1]
Ameripol 1705	.2035 [1]
Ameripol 1707	.1910 [1]
Ameripol 1708	.1910 [1]
Ameripol 1710	.1885 [1]
Ameripol 1712	.1885 [1]
ASRC 1000	.2410 [1]
ASRC 1001	.2410 [1]
ASRC 1004	.2410 [1]
ASRC 1006	.2410 [1]
ASRC 1009	.2475 [1]
ASRC 1018	.2700 [1]
ASRC 1019	.2650 [1]
ASRC 1500	.2410 [1]
ASRC 1502	.2410 [1]
ASRC 1503	.2625 [1]
ASRC 1703	.2060 [1]
ASRC 1708	.1910 [1]
ASCR 3110	.2600 [1]
Baytown 1600	.1760 [1]
Baytown 1601	.1760 [1]
Baytown 1602	.1760 [1]
Baytown 1801	.1600 [1]
Copo 1500	.2410 [1]
Copo 1502	.2410 [1]
Copo 1505	.2610 [1]
Copo 1712	.1885 [1]
FR-S 1000	.2410 [1]
FR-S 1001	.2410 [1]
FR-S 1004	.2410 [1]
FR-S 1006	.2410 [1]
FR-S 1009	.2475 [1]
FR-S 1010	.2600 [1]
FR-S 1012	.2425 [1]
FR-S 1013	.2500 [1]
FR-S 1014	.2810 [1]
FR-S 1015	.2910 [1]
FR-S 1500	.2410 [1]
FR-S 1502	.2410 [1]
FR-S 1703	.2060 [1]
FR-S 1705	.2035 [1]
FR-S 1712	.1885 [1]
Naugapol 1016	.2650 [1]
Naugapol 1018	.2700 [1]
Naugapol 1019	.2650 [1]
Naugapol 1021	.3000 [1]
Naugapol 1022	.2800 [1]
Naugapol 1023	.2850 [1]
Naugapol 1503	.2625 [1]
Naugapol 1504	.2950 [1]
Philprene 1000	.2410 [1]
Philprene 1001	.2410 [1]
Philprene 1006	.2410 [1]
Philprene 1009	.2475 [1]
Philprene 1010	.2600 [1]
Philprene 1018	.2700 [1]
Philprene 1019	.2650 [1]
Philprene 1100	.1940 [1]
Philprene 1104	.1900 [1]
Philprene 1500	.2410 [1]
Philprene 1502	.2410 [1]
Philprene 1503	.2625 [1]
Philprene 1600	.1930 [1]
Philprene 1601	.1930 [1]
Philprene 1605	.1900 [1]
Philprene 1703	.2060 [1]
Philprene 1706	.2030 [1]
Philprene 1708	.1910 [1]
Philprene 1712	.1885 [1]
Philprene 1803	.1740 [1]
Plioflex 1006	.2410 [1]
Plioflex 1500	.2410 [1]
Plioflex 1502	.2410 [1]
Plioflex 1703	.2060 [1]
Plioflex 1710	.1885 [1]
Plioflex 1712	.1885 [1]
Plioflex 1773	.2060 [1]
Plioflex 1778	.1910 [1]
Polysar Kryflex 200	.2510 [1]
Polysar Krylene	.2410 [1]
Polysar Krylene NS	.2410 [1]
Polysar Krynol 651	.1885 [1]
Polysar Krynol 652	.1910 [1]
Polysar S	.2410 [1]
Polysar S-50	.2410 [1]
Polysar S-X 371	.2550 [1]
Polysar SS-250	.2875 [1]
S-1000	.2300 [1]
S-1001	.2300 [1]
S-1002	.2325 [1]
S-1006	.2300 [1]
S-1011	.2325 [1]
S-1013	.2300 [1]
S-1100	.1850 [1]
S-1500	.2300 [1]
S-1502	.2300 [1]
S-1600	.1825 [1]
S-1601	.1825 [1]
S-1602	.1825 [1]
S-1703	.1950 [1]
S-1706	.1925 [1]
S-1707	.1800 [1]
S-1709	.1775 [1]
S-1712	.1775 [1]
S-1801	.1675 [1]
S-1803	.1650 [1]
Synpol 1000	.2410 [1]
Synpol 1001	.2410 [1]
Synpol 1002	.2435 [1]
Synpol 1006	.2410 [1]
Synpol 1007	.2410 [1]
Synpol 1009	.2475 [1]
Synpol 1012	.2425 [1]
Synpol 1013	.2500 [1]
Synpol 1061	.2410 [1]
Synpol 1500	.2410 [1]
Synpol 1502	.2410 [1]
Synpol 1551	.2410 [1]
Synpol 1703	.2060 [1]
Synpol 1707	.1910 [1]
Synpol 1708	.1910 [1]
Synpol 1711	.1900 [1]
Synpol 1712	.1885 [1]

Butyl Rubbers

Enjay Butyl 035 and 150	.2300 [2]
Enjay Butyl 165 NS	.2400 [2]
Enjay Butyl 215	.2300 [2]
Enjay Butyl 217	.2300 [2]
Enjay Butyl 218	.2300 [2]
Enjay Butyl 268 NS	.2400 [2]
Enjay Buty 325	.2300 [2]
Enjay Butyl 365 NS	.2400 [2]
Polysar Butyl 100	.2450 [2]
Polysar Butyl 101	.2175 [2]
Polysar Butyl 200 and 300	.2450 [2]
Polysar Butyl 301	.2550 [2]
Polysar Butyl 400	.2450 [2]

Chlorosulfonated Polyethylene

Hypalon 20	.7000 [2]
Hypalon 30	.7000 [2]

Neoprene

	(prices l.c.l.)
Neoprene Types AC and CG	.5500 [2]
Neoprene Type GN	.4100 [2]
Neoprene Type GN-A	.4100 [2]
Neoprene Type GRT	.4200 [2]
Neoprene Type KNR	.7500 [2]
Neoprene Type S	.4200 [2]
Neoprene Type W	.3900 [2]
Neoprene Type WHV	.3900 [2]
Neoprene Type WRT	.4500 [2]
Neoprene Type WX	.4100 [2]

Polysulfide Rubbers

	(prices l.c.l.)
Thiokol Type A	.4700 [2]
Thiokol Type FA	.6400 [2]
Thiokol PR-1	.9500 [2]
Thiokol Type ST	1.00 [2]

Silicone Rubbers*

	(prices l.c.l.)
GE (compounded)	2.50 [2]
GE Silicone Gum (not compounded)	4.00 [2]
Silastic (compounded)	1.90 [2]
Silastic (gums)	3.85 [2]
Union Carbide (gums)	4.00 [2]
Union Carbide (compounds)	2.50 [2]

Latex

(per pound carload)

Butadiene-Acrylonitrile Types

Butaprene N-300	.4600 [1]
Butaprene N-400	.5400 [1]
Butaprene N-401	.5400 [1]
Chemigum 200	.4900 [1]
Chemigum 235	.5400 [1]
Chemigum 236	.5400 [1]
Chemigum 245	.4600 [1]
Chemigum 246	.4600 [1]
Hycar 1512	.4600 [1]
Hycar 1551	.5400 [1]
Hycar 1552	.4600 [1]
Hycar 1561	.5400 [1]
Hycar 1562	.4600 [1]
Hycar 1571	.5400 [1]
Hycar 1572	.5100 [1]
Hycar 1577	.4600 [1]
Hycar 1852	.4600 [1]
Nitrex 2612	.4600 [1]
Nitrex 2614	.4600 [1]
Nitrex 2614-A	.4600 [1]
Nitrex 2615	.5100 [1]
Nitrex 2615-A	.5100 [1]
Nitrex 2616	.5400 [1]
Nitrex 2617	.4600 [1]
Nitrex 2617-A	.4600 [1]
Nitrex 2619	.5300 [1]
Nitrex 2620	.4600 [1]
Nitrex 2625	.4600 [1]

Butadiene-Styrene Types

Copo 2101	.3000 [1]
Copo 2102	.3200 [1]
Copo 2105	.3200 [1]
Copo X-765	.3000 [1]
FR-S 2000	.2775 [1]
FR-S 2001	.2775 [1]
FR-S 2002	.3000 [1]
FR-S 2003	.3050 [1]
FR-S 2004	.3050 [1]
FR-S 2006	.2900 [1]
FR-S 2105	.3200 [1]
Naugatex 2000	.2775 [1]
Naugatex 2001	.2775 [1]
Naugatex 2002	.3000 [1]
Naugatex 2006	.2900 [1]
Naugatex 2105	.3200 [1]
Naugatex 2107	.3200 [1]
Naugatex 2108	.3000 [1]

POLYMERS

Pliolite 2000	.2775 [3]
Pliolite 2076	.2900 [3]
Pliolite 2101	.2775 [3]
Pliolite 2104	.3200 [3]
Pliolite 2105	.3200 [3]
Pliolite 2107	.3250 [3]
Pliolite 2108	.3050 [3]
S-2000	.2275 [3]
S-2006	.2150 [3]
S-2101	.2250 [3]
S-2105	.3100 [3]
S-2107	.3200 [3]

Neoprene

Neoprene Latex 60	.4000 [3]
Neoprene Latex 571	.3700 [3]
Neoprene Latex 572	.3900 [3]
Neoprene Latex 601-A	.4000 [3]
Neoprene Latex 735	.3800 [3]
Neoprene Latex 736	.3800 [3]
Neoprene Latex 842-A	.3700 [3]
Neoprene Latex 950	.4700 [3]

Polysulfide Rubbers

Thiokol Type MX	.7000 [3]
Thiokol Type WD-2	.9200 [3]
Thiokol Type WD-6	.7000 [3]

Notes: (1) Freight allowed. (2) Freight extra. (3) Freight prepaid. *Covers a wide range of compounds. Readers are urged to check specific prices with producers.

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MARKETS

(continued)

Reclaimed Rubber

The reclaimed rubber market continues to evidence the lethargy shown by the rest of the economy. As noted in the article on "scrap rubber" which appears below, one major reclaimer has been closing down for one week a month and there are indications from the trade that this "pattern" may continue until activity heightens.

And so the "round robin" continues. Automobile production down means less reclaim consumed. Less reclaim consumed means less scrap consumed. The normal seasonal upturn may not be as healthy as in the past years, some in the trade believe, because of record inventories of automobiles, said to number close to 1,000,000.

The production-consumption pattern for reclaim is running at about 20,000 long tons a month making for a 240,000 ton year in both categories, dropping from the 1957 figures. Even these figures represent peak estimates and assume an upturn within the next few months. Current prices for reclaimed rubber follow:

(Prices for All Areas Except Calif.)

	per lb.
Premium Grade Whole Tire	.11½
First Line Whole Tire	.11
Second Line Whole Tire	.10½
Third Line Whole Tire	.10¼
Fourth Line Whole Tire	.09¾
Black Carcass	.15¼
No. 1 Light Colored Carcass	.22
No. 1 Peel	.11
Butyl Tube Reclaim	.14
Natural Rubber Black Tube	.16
Natural Rubber Red Tube	.21
Natural Rubber Gray Tube	.21

Scrap Rubber

Exports of scrap rubber from the United States in November, 1957, showed a sharp increase over shipments in October according to statistics released by the Bureau of the Census, U. S. Department of Commerce. Scrap rubber exports for November totaled 6,511,764 pounds valued at $173,568, compared with October's 5,087,873 pounds worth $174,322. It is interesting to note that while November's shipments topped those of October by over 1,400,000 pounds, the dollar value was less.

Imports of scrap rubber in November amounted to 1,148,593 pounds valued at $47,398, against imports of 1,497,173 pounds valued at $60,477 in the month of October.

Marketwise, little change has been reported in the scrap rubber market during the past period. One reclaimer closed down the week of March 24 and there are indications that this facility will close down one week each month as long as the current market situation continues.

(Prices Delivered Akron)

Mixed tires	ton	14.50
Light colored carcass	lb.	.04½
No. 1 peelings	ton	30.00
No. 2 peelings	ton	25.00
No. 3 peelings	ton	18.00
Buffings	ton	16.00
Truck and Bus S.A.G.	ton	19.00
Passenger S.A.G.	ton	17.50
Natural Rubber Red Tubes	lb.	.07½
Natural Rubber Black Tubes	lb.	.07
Butyl Rubber Tubes	lb.	.04½

Tire Fabrics

Current reports indicate that industrial textile producers, experiencing a steady decline in new orders and backlogs in the last year, have trimmed their operations considerably for what is expected to be a more expected letdown in demand. As buying by automobile and rubber manufacturers fell off quarter by quarter, production schedules were cut back accordingly by weaving mills, tire yarn producers, vinyl plastic, coated fabric and other plants.

The *New York Journal of Commerce* reports that any return in industrial fabrics consequently will hinge on what happens in the months ahead in the nation's basic industries, especially in the automotive industry. On the basis of most indicators, the near-term outlook does not appear too promising for most industrial textiles.

Automobile Industry Consumption

The automobile industry is a gigantic consumer of textile fibers, having purchased 53,437,410 pounds of cotton in the form of upholstery and interior lining fabrics in 1955 when automobile output hit the all-time high of 7.9 million.

In that same year, the automobile industry purchased 157,185,778 pounds of cotton for seat padding; 57,890,387 pounds of foam rubber; 49,766,476 pounds of vinyl materials; 11,759,697 pounds of rayon; 7,666,252 pounds of nylon, and 1,392,723 pounds of wool. The tire industry in 1955 used 483.9 million pounds of fiber, including 375.1 million pounds of rayon for tire fabric and cord.

Recent sharp cutbacks in automobile output, which reached 6,115,000 units in 1957, forced parallel curtailments in some industrial textiles. Moreover, sales estimates for this year do not indicate any sharp upswing in the months ahead. According to some estimates, the automobile industry is facing a relatively poor year, with output estimated at from 4.8 to 5.5 million units.

Mill Inventories High

Mill inventories of industrial fabrics, as with most other textiles, are considered excessive in relation to sales volume, although a number of industrial cloth mills have cut down stocks below the level of early last year. Inventories in the hands of most users of industrial textiles generally are reported to be quite low. Some in the trade feel that with the low level of inventories a pickup in activity will mean an old fashioned seller's market.

(Prices f.o.b. Shipping Point)

Rayon Tire Cord

1100	lb.	.73
1650	lb.	.67
2200	lb.	.67½

Nylon Tire Cord

210	lb.	1.95
840	lb.	1.80

Rayon Graded Fabric

1100	lb.	.69
1650	lb.	.63½
2200	lb.	.63

Cotton Chafers

8.9 oz. (per square yard)	lb.	.68
9.25 oz. (per square yard)	lb.	.66
11.65 oz. (per square yard)	lb.	.62
14.4 oz. (per square yard)	lb.	.71

Liquid Latex

Natural: The price of natural rubber latex remains at a 33-34c per pound level in carload lots at East Coast ports and were it not for the general slowdown in all fields of activity greater quantities would be moving. A period of stability has characterized the natural rubber latex market since the beginning of the current year.

Last year a total of 73,100 long tons of natural rubber latex were consumed in the United States according to the U. S. Department of Commerce, and this figure was about 3,500 long tons less than in the previous year. Of course, early statistics for 1958 are not indicative of a general trend. However, one may speculate on the possibilities and on this basis it appears as if consumption of natural rubber latex in 1958 will approach a 70,000 long ton level.

By all accounts, this will not be a "poor" year in any sense of the word. The drop in consumption would have to be recognized as a facet of the general economy rather than an indication of natural latex's declining popularity.

Synthetic: The synthetic latices are troubled by the same conditions which bear upon natural latex, that is the general inability of the market to get off the ground. The relatively stable price structure for the synthetic latices can no longer be considered a singular virtue in the over-all latex market, for natural latex has been exhibiting a markedly stable price structure during the past few months.

As with many other commodities, the synthetic latices must now await developments on the general economic scene before they can move either upward or downward.

Cotton

The price of middling uplands on the New York Cotton Exchange has moved in the exceedingly small range of 30 points since our last report (March 3), high for the period being 36.25c reached on March 27 and 28, and low being 35.95c reached on March 3 and on six other days during the period. The average price of middling uplands for the month of March was 36.05c based on 21 trading days. This compares with an average of 35.83c in the month of February.

According to trade advices, the Department of Agriculture may soon announce a dual program for cotton exports. At present, the export program is operated on a bid basis, with shippers bidding for cotton in the inventory of the Commodity Credit Corp. Because CCC inventory has declined sharply and because the qualities in inventory are comparatively low, USDA had planned to set up an export subsidy program, paying exporters in government-owned cotton so the new crop could be exported.

A House Appropriations Subcommittee is apparently convinced that the bid-basis program be maintained. It appears, however, that USDA will set up some sort of dual program encompassing both the bid plan and the export subsidy plan.

USDA officials have privately indicated that they believe the dual program will be wasteful, but is probably the best solution to the problem at the present time.

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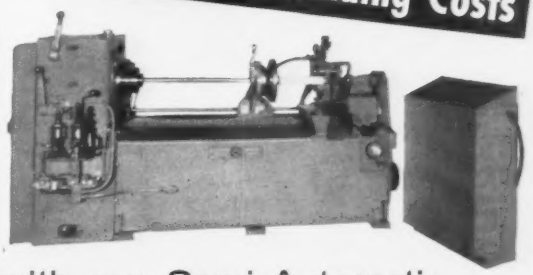

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MARKET PRICES

CHEMICALS & COMPOUNDING INGREDIENTS

FEBRUARY 3, 1958

Prices are, in general, f.o.b. works and cover the domestic markets only. Export prices, as a rule, are usually slightly higher, due to packing regulations, special handling, etc.

Abbreviations: bbls., barrels; c.l., carload; cyl., cylinder; dlvd., delivered; dms., drums; eqld., equalized; l.c.l., less than carload; M.B. masterbatch; min., minimum; ref., refined; sap., saponified; sp., special; syn., synthetic; t.c., tank cars.

*Trademark. †For Export Only.

The arrangement of this section closely follows the Chemical Section of the 1957-58 RUBBER RED BOOK. Readers are referred to that edition for the correct classification of any material or brand name. Suppliers of every material are contacted for price information. However, only those materials are listed for which quotations have been furnished within the past six months. The quotations are not guaranteed and prospective purchasers should contact suppliers for information. Suppliers are requested to send current price information to the Market Editor, RUBBER AGE.

ACCELERATORS

A-1 (Thiocarbanilide)*	lb.	.72	.79
A-32*	lb.	.66	.80
A-100*	lb.	.52	.66
Accelerator No. 8*	lb.	—	1.25
Accelerator—49*	lb.	.59	.60
Accelerator 89*	lb.	—	1.20
Accelerator 108*	lb.	.92	.97
Accelerator—552*	lb.	—	2.25
Accelerator—808*	lb.	.66	.68
Accelerator—833*	lb.	1.17	1.19
Accelerator B*	lb.	—	.89
Altax*	lb.	.54	.56
Ancap*(†)	lb.	.38	.40
Ancatax*(†)	lb.	.48	.50
Ancazate BU (ET & ME)*(†)	lb.	—	1.07
Ancazide ET*(†)	lb.	—	1.07
ME*(†)	lb.	—	1.14
Arazate*	lb.	—	2.25
Arquad 12*	lb.	.55	.61
Beutene*	lb.	.66	.71
Bismate, Rodform*	lb.	—	3.00
Butazate*	lb.	.87	.92
Butyl Eight*	lb.	1.10	1.35
Butyl Namate	lb.	.45	.50
Butyl, Ethyl & Methyl Zimate Slurry (50% solids content)	lb.	.85	.89
Captax*	lb.	.44	.46
C-P-B*	lb.	1.95	2.00
Cumate, Rodform*	lb.	—	1.45
Diorthotolylguanidine	lb.	.62	.63
Dipac*	lb.	—	.85
Diphenylguanidine	lb.	.54	.60
El-Sixty*	lb.	.62	.69
Ethazate*	lb.	—	1.04
50D*	lb.	.87	.92
Ethyl Thiurad*	lb.	—	1.04
Ethyl Tuex*	lb.	—	1.04
Ethylac*	lb.	.93	.95
Guantal*	lb.	.62	.69
Harvex*	lb.	.70	.76
Hepteen Base*	lb.	1.85	1.90
Kure-Blend MT*	lb.	—	.70
Ledate, Rodform*	lb.	—	1.04
MBT-XXX*	lb.	.53	.55
Merac*	lb.	.75	1.05
Mercaptobenzothiazole	lb.	.42	.44
Mercaptobenzothiazyl Disulfide	lb.	.52	.54
Mertax*	lb.	.55	.57
Methazate*	lb.	—	1.04
Monex*	lb.	—	1.14
Mono Thiurad*	lb.	—	1.14
Morfex*	lb.	.65	.67
2-MT	lb.	—	1.00
NA-22* (for neoprene)	lb.	—	1.05
NOBS No. 1*	lb.	.76	.78
Special*	lb.	.80	.82
O-X-A-F	lb.	.55	.57
Pennac SDB*	lb.	.45	.48
Pentex*	lb.	—	1.24
Flour*	lb.	—	.30
Permalux (Neoprene)*	lb.	—	2.25
Phenex*	lb.	.55	.57
Polyac*	lb.	—	1.85
R-2 Crystals*	lb.	—	4.35
Rotax*	lb.	.55	.57
RZ-50-A*	lb.	—	1.00
B*	lb.	—	1.00
Santocure*	lb.	.76	.83
NS*	lb.	.80	.87
Selenac* (Ethyl, Methyl)	lb.	—	4.25
Seleram, Ethyl	lb.	—	3.00
Setsit-5*	lb.	.75	1.05
9*	lb.	.85	1.15
SPDX-GH*	lb.	.74	.76
GL*	lb.	1.20	1.30
Tellurac*	lb.	—	1.45
Tepidone*	lb.	.45	.48
Tetrone A*	lb.	—	1.98
Thiofide*	lb.	.54	.56
S*	lb.	.64	.66
Thionex*	lb.	—	1.14
Thiotax*	lb.	.44	.51
Thiram, Ethyl	lb.	—	1.04
Methyl	lb.	—	1.14
Thiurad*	lb.	—	1.14
Thiuram E*	lb.	—	1.04
M*	lb.	—	1.14
Trimene*	lb.	.56	.62
Base*	lb.	1.03	1.10
Triphenyl Guanidine	lb.	—	.90
Tuads* (Ethyl)	lb.	—	1.04
Tuads* (Methyl)	lb.	—	1.14
Tuex*	lb.	—	1.14
Ultex*	lb.	1.00	1.10
Unads*	lb.	—	1.14
ZB*	lb.	—	.85
ZE*	lb.	—	.85
ZM*	lb.	—	.85
Vulcacure NB*	lb.	.45	.45
NS*	lb.	.75	1.05
ZB*, ZE*, ZM*	lb.	.85	.89
Z-B-X*	lb.	2.45	2.50
Zenite*	lb.	.54	.56
Zenite A*	lb.	.69	.71
Zenite Special*	lb.	.55	.57
Zetax* (uncoated)	lb.	.55	.57
Zimate* (Butyl)	lb.	—	1.04
Zimate* (Ethyl)	lb.	—	1.04
Zimate* (Methyl)	lb.	—	1.04
Ziram, Butyl	lb.	—	1.04
50% Dispersion	lb.	.87	.89
Ziram, Ethyl	lb.	—	1.04
50% Dispersion	lb.	.87	.89
Ziram, Methyl	lb.	—	1.04
50% Dispersion	lb.	.87	.89

ACTIVATORS

Blue Lead Sublimed (dlvd.)	lb.	.17¼	.18¼
Cottonseed Fatty Acids			
Wochem 210*	lb.	.16¾	.19¾
211*	lb.	.16¾	.19¾
Fish Oil, Hydrogenated, Fatty Acid			
DAR-S* (dlvd.)	lb.	.12¾	.15¼
DAR-HY* (lvd.)	lb.	.16	.18½
Hydrofol Acids* (dlvd.)	lb.	.12¾	.25¾
Hyfac 430* (dlvd.)	lb.	.18	.20½
Neo-Fat H.F.O.* (dlvd.)	lb.	.14½	.15¾
Neutrex* (dlvd.)	lb.	.15¾	.18¼
Stearex Beads* (dlvd.)	lb.	.09¾	.10¾
Stearite*	lb.	.12	.14
Talene* (dlvd.)	lb.	.17	.19½
Lime, Hydrated			
Arrowhead*	ton	—	21.00
Marblehead*	ton	—	17.75
Sierra*	ton	—	22.50
Litharge			
Eagle-Picher* (c.l.)	lb.	.18	—
SB* (dlvd.)	lb.	—	.18½
Magnesium Oxide, Heavy			
General Magnesite 500*	lb.	.05½	.06
600*	lb.	.06½	.07
Kaiser 325*	lb.	.057	.073
Michigan No. 15*	lb.	.05½	.06½
Magnesium Oxide, Light			
Carey Mag*	lb.	.25¼	.26
General Magnesite* (neoprene grade)	lb.	.30	.32
General Magnesite No 101*	lb.	.25¼	.26
Genmeg MLW*	lb.	.25¼	.26

ACTIVATORS (Cont'd)

Magnesium Oxide, Light (cont'd)			
K & M* (neoprene grade)	lb.	.29¼	.30
Light Calcined Magnesia			
No. X-01*	lb.	.25¼	.26
Maglite D*	lb.	.25¼	.26
L and M*	lb.	.29¼	.30
Michigan No. 30*	lb.	.25¼	.26
Neomag Powder*	lb.	.29¼	.30
Pellets*	lb.	.31¼	.32
Michigan No. 40*	lb.	.29¼	.30
Oleic Acid			
Emersol 210* (dlvd.)	lb.	.18½	.21
Groco Red Oil	lb.	.18½	.21
Neo-Fat 92-04*	lb.	.20½	.22½
94-04*	lb.	.18½	.20½
Wochem 310, 311	lb.	.18½	.21
Palm Fatty Acids			
Groco 45*	lb.	.15¾	.18¼
Neo-Fat*	lb.	.15¾	.17¾
Wochem 280*	lb.	.15¾	.18¼
281*	lb.	.16¼	.18¾
Potassium Oleate (dms.)	lb.	.30	.73
Red Lead			
Eagle-Picher* (c.l.)	lb.	.19	—
No. 2 RM* (dlvd.)	lb.	—	.18½
Sodium Laurate, 75%	lb.	.64	.89
Sodium Oleate, 75%	lb.	.54	.79
Paste (dms.)	lb.	.39	.64
Sodium Stearate, 75%	lb.	.54	.89
Stearic Acid, Single Pressed			
Emersol 110* (dlvd.)	lb.	.16½	.19
Groco 53*	lb.	.16½	.19
Neo-Fat 18-53*	lb.	.14¾	.16¾
Standard Pearlstearic* (dlvd.)	lb.	.16	.18½
Stearex B* (dlvd.)	lb.	.15½	.16¾
Wochem 730*	lb.	.13¾	.15¾
Stearic Acid, Double Pressed			
Choice Pearlstearic* (dlvd.)	lb.	.16½	.19
Emersol 120* (dlvd.)	lb.	.17	.19½
Groco 54*	lb.	.17	.19½
Hydrofol Acid 51RG	lb.	.13¼	.15¾
Neo-Fat 18-54*	lb.	.15¾	.17¾
Wochem 731*	lb.	.16	.18½
Stearic Acid, Other			
Extra Pearlstearic* (dlvd.)	lb.	.18¾	.21¼
Groco*	lb.	.12	.14
Neo-Fat 18*	lb.	.18½	.20½
18-58*	lb.	.14¾	.16¾
18-61*	lb.	.16¼	.18¾
Stearite*	lb.	.11¾	.13¾
Wochem 720*	lb.	.11¾	.14¼
721*	lb.	.11¾	.14¼
732*	lb.	.17	.19½
White Lead Basic Carbonate	lb.	.19	.20
White Lead Basic Sulfate	lb.	.17¼	.18¼
Zinc Laurate			
Laurex*	lb.	.33	.34
Zinc Stearate	lb.	.41	.46
Aquazinc K.C.*	lb.	.30	.55
Crown Brand*	lb.	.39	.44

Unclassified Activators

Actifat* (dms.)	lb.	—	.18
Aktone*	lb.	.21¼	.23¼
Barak*	lb.	—	.62
Curade*	lb.	.57	.59
Dibenzo G-M-F	lb.	—	2.60
D-B-A*	lb.	—	1.95
G-M-F*	lb.	—	2.60
Dibutylamine (dlvd.)	lb.	.55½	.56½
MODX*	lb.	.36	.38
Neo Fat 42-07*	lb.	.10¼	.12¼
Ridacto* (dms.)	lb.	.25	.26
Snodotte* (dlvd.)	lb.	.19	.21½
Vimbra	lb.	.32	.38½
Vulklor*	lb.	.88	.98

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Aqua Ammonia* (dms.)	lb.	.031	.035
M.B.M.C.* (l.c.l.)	lb.	.54	.76

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Aero Anti Foam H*	lb	—	.20
Regular*	lb.	—	.12
Anhydrol 6991*	lb.	.51	.56
D.C. Antifoam A*	lb.	5.45	6.65
Antifoam A Emulsion*	lb.	2.05	4.00
Antifoam AF Emulsion*	lb.	2.05	2.85
Defoama W-1701*	lb.	—	.12½

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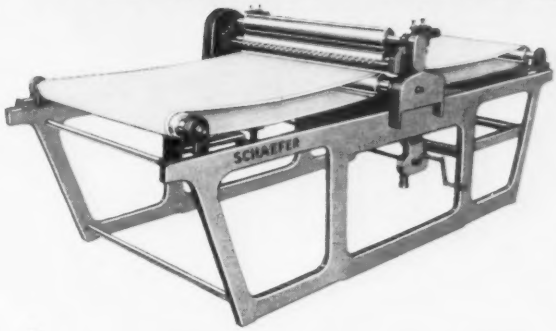

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Factice
THE STAMFORD RUBBER SUPPLY CO.
Vulcanized Oil

THE STAMFORD RUBBER SUPPLY CO.

Factice®

A COMPLETE LINE OF
WHITE
BROWN
and AMBER
GRADES

OLDEST AND LARGEST MANUFACTURERS
OF Factice VULCANIZED OIL
SINCE 1900

LEADERS IN THE FIELD
For
RESEARCH and
MANUFACTURING
DEPENDABILITY

THE STAMFORD RUBBER SUPPLY COMPANY, STAMFORD, CONN.

ANTI-FOAMING AGENTS (Cont'd)

Defoamer A-25*	lb.	——	3.00
Defoamer 630*	lb.	——	.14
Deltyl Prime	lb.	.70	.80
G-E Antifoam SS-24*	lb.	5.30	6.65
SS-66*	lb.	5.30	6.65
60 Emulsion*	lb.	2.05	3.75
Igepol CO-210	lb.	——	.36
Kessco X-3* (dms.)	lb.	——	.35
X-180*	lb.	——	.29¾
X-181*	lb.	——	.38½
Nopco 1407*	lb.	.19½	.20½
1497-V*	lb.	.13¾	.14¾
1907-B*	lb.	.18¼	.19¼
JMK*	lb.	.48	.49
JMU*	lb.	.22½	.23½
JMY*	lb.	.19¼	.20¼
Pluronic L61*	lb.	.33½	.39
RS-968*	lb.	.38	.38½
Terpinol Prime No. 1	lb.	.35	.50
Tributyl Phosphate (dms.)	lb.	.52½	.53½

ANTIOXIDANTS

Agebest 1293-22A*	lb.	1.90	2.00
AgeRite Alba*	lb.	2.40	2.50
Gel*	lb.	.70	.72
Hipar*	lb.	1.05	1.07
H.P.*	lb.	.79	.81
Powder*	lb.	.57	.59
Resin*	lb.	.88	.90
Resin D*	lb.	.57	.59
Spar*	lb.	.57	.59
Stalite*	lb.	.57	.59
Stalite S*	lb.	.57	.59
Superlite*	lb.	.57	.59
White*	lb.	1.50	1.60
Akroflex C*	lb.	.85	.87
CD*	lb.	.79	.81
Ammox*	lb.	.57	.62
Antioxidant 425*	lb.	2.47	2.50
Antioxidant 2246*	lb.	1.50	1.53
Antox*	lb.	.59	.61
Aranox*	lb.	3.25	3.30
Benzoquinone	lb.	1.50	1.75
Betanox Special*	lb.	.91	.96
B-L-E*	lb.	.57	.62
B-X-A*	lb.	.55	.57
Catalin CAO No. 1*	lb.	.91	.95
CAO No. 5*	lb.	1.49	1.50
Deenax*	lb.	.95	1.05
Di-tert-Butyl-para-Cresol	lb.	.86	1.16
Eugenol C-95%*	lb.	2.30	2.50
Flectol H*	lb.	.57	.64
Flexamine*	lb.	.79	.84
Ionol* (dms.)	lb.	.91	.95
Neozone A*	lb.	.64	.66
C*	lb.	.86	.88
D*	lb.	.57	.59
Nevastain A*	lb.	.51	.61
B*	lb.	.51	.70
Nullapon BF-12*	lb.	——	.21½
BF-13*	lb.	——	.25½
BF-78*	lb.	——	.55
BF-Acid*	lb.	——	.85
Octamine*	lb.	.57	.62
Oxidex*	lb.	——	3.00
PDA-10*	lb.	.46	.48
Permalux*	lb.	——	2.25
Polygard*	lb.	.52	.62
Santoflex AW*	lb.	.79	.86
DD*	lb.	.57	.64
75*	lb.	1.01	1.08
Santovar-A*	lb.	1.55	1.57
Santowhite Crystals*	lb.	1.55	1.62
Santowhite L*	lb.	.57	.64
MK*	lb.	1.25	1.32
Powder*	lb.	1.55	1.62
Sequestrene AA*	lb.	.76	.85
NA2*	lb.	.62	.70
NA3*	lb.	.61	.69
Stabilite*	lb.	.55	.57
Alba*	lb.	.74	.79
FLX*	lb.	.76	.78
L*	lb.	.63	.65
White*	lb.	.52	.54
White Powder*	lb.	.41	.43
Stabilizer No. 1*	lb.	1.55	1.80
Stabilizer No. 9-A*	lb.	.80	1.05
Styphen I*	lb.	.51	.55
Sunolite*	lb.	.16	.22
Tecquinol*	lb.	.82½	.84½
Tannic Acid, Tech.	lb.	.46	.48
Tenamene 3*	lb.	.91	.95
Thermoflex A*	lb.	1.05	1.07
V-G-B*	lb.	.75	.77
Wing-Stay S*	lb.	.53	.57

ANTIOZONANTS

Eastozone 30*	lb.	1.24	1.26
31*	lb.	1.24	1.26
32*	lb.	1.72	1.74
UOP 88* & 288* (dms)	lb.	——	1.26

ANTI-SCORCHING AGENTS

Armeen HT*	lb.	.34	.40
Good-rite Vultrol*	lb.	.62	.64
Harcopol 1183*	lb.	.70	.74
Retarder PD*	lb.	.37	.39
W*	lb.	——	.42
Sodium Acetate 60-62% Crystals	lb.	.08	.08½

ANTISEPTICS AND GERMICIDES

A.P.C. 6901*	lb.	.32	.38
Arquad S*	lb.	.38	.44
Formaldehyde (dms.)	lb.	.06	.076
G-4* (bbls.)	lb.	1.09	1.29
G-11*	lb.	1.98	2.08
Halane*	lb.	.40	.47
Ortho Cresol (26°—27°)	lb.	.14	.16¼
Preventol GD	lb.	——	1.09
Retarder D*	lb.	.42	.50
Vancide	lb.	——	.80

ANTI-WEBBING AGENTS (for Latex)

DC 7 Compound*	lb.	5.13	6.50
Webnix 34-L*	lb.	1.25	1.75
69-C*	lb.	1.50	2.25

AROMATICS (DEODORANTS)

Airkem 115*	gal.	——	6.50
122*	gal.	——	6.50
186*	gal.	——	6.50
Alamask AA*	lb.	——	3.00
AF*	lb.	——	2.50
AO*	lb.	——	1.50
AR*	lb.	——	.50
BG*	lb.	——	1.15
BGM*	lb.	——	.60
CY*	lb.	——	2.40
DJ*	lb.	——	3.35
DL*	lb.	——	1.95
H*	lb.	——	5.50
LD*	lb.	——	.75
ND*	lb.	——	2.75
O*	lb.	——	6.50
OS*	lb.	——	5.25
Bouquet 149*	lb.	——	3.00
Coumarin*	lb.	——	3.70
Curodex 19*	lb.	4.75	4.90
188*	lb.	5.75	5.90
198*	lb.	6.75	6.90
Deodorant 65*	lb.	——	1.85
Deodorant L-37*	lb.	2.15	2.25
L-44*	lb.	2.65	2.75
N.L.T.X.*	lb.	1.90	2.00
Deodorant Oil GD 6422*	lb.	1.90	2.20
GD 6423*	lb.	1.60	1.90
GD 6575*	lb.	2.40	2.90
GD 31063*	lb.	2.25	2.75
Ethavan*	lb.	6.20	6.25
Latex Perfume 17326	lb.	——	4.00
18301	lb.	——	3.00
22258	lb.	——	2.50
Naugaromes* (dms.)	lb.	.60	3.00
Neutroleum Delta*	lb.	——	2.60
Gamma*	lb.	——	3.60
Parador A*	lb.	1.80	2.10
C*	lb.	2.00	2.50
E*	lb.	.25	.40
GD 5280*	lb.	2.00	2.50
GD 53481*	lb.	1.70	2.00
Perfume Oil Bouquet Vanilla M*	lb.	1.60	1.70
Rodo No. 0*	lb.	4.00	4.50
No. 10*	lb.	5.00	5.50
Rubbarome* (dms.)	lb.	.60	3.80
Rubber Perfume 12*	lb.	——	4.35
Russian Leather 7*	lb.	——	4.35
Vanillin	lb.	2.75	2.80

BLOWING AGENTS

Ammonium Bicarbonate	cwt.	——	8.00
Better Blend Soda* (c.l., bags)	cwt.	——	2.55
Blowing Agent No. 81105	lb.	.32	.35
Celogen*	lb.	——	1.95
AZ*	lb.	——	1.95
Diazo Amino Benzene	lb.	——	.73
Kempore R-125	lb.	——	1.95
Neo Fat 42-12*	lb.	.10¼	.12¼
Opex 40	lb.	——	.76
Sodium Bicarbonate, U.S.P. (c.l., bags)	cwt.	——	2.40
Sponge Paste*	lb.	——	.20
Unicel ND*	lb.	——	.76
S*	lb.	——	.20
Urea	lb.	.06	.07

BONDING AGENTS

Base 6986*	lb.	.27	.32
Braze*	gal.	6.00	9.00
Chemlok 201, 203, 220, 401, 607	gal.	5.00	24.00
614	lb.	4.35	4.75
Cover Cement*	gal.	2.50	4.00
Durez 12987*	lb.	——	.54
Gen-Tac Latex*	lb.	.70	.75
Hylene M*	lb.	3.50	3.75
M-50*	lb.	1.90	2.15
Penacolite B1A*	lb.	——	.95
R-2710*	lb.	——	.95
Pliobond 20*	gal.	2.91	4.23
30*	gal.	3.65	4.97
Rex Compounds*	gal.	1.30	1.90
Thixons*	gal.	3.30	9.00
Ty-Ply Q (BN & S)*	gal.	6.75	8.00
Tygobond 30*	gal.	5.50	7.45
Vinculux	gal.	——	4.95

COAGULANTS

Acetic Acid—56% (bbls. cwt.		9.00	11.00
Glacial 99½% (dms.)	lb.	.12	.13
Calcium Nitrate, Tech. Flake	lb.	.12½	.15
Hydroxyacetic Acid—70% (dms.)	lb.	——	.09½
Zinc Nitrate, Tech. Flake	lb.	——	.20

COLORING AGENTS

Black

Aquablak B*	lb.	.09¾	.10¾
M*	lb.	.10½	.11
R*	lb.	.10¾	.11¾
S*	lb.	.11¾	.12¾
Black Shield 4-35* (dms)	lb.	.09	.09½
No. 5	lb.	.10	.10½
No. 6	lb.	.09	.09½
L-1404B	lb.	.10½	.11
Carbon Black—See *Reinforcing Agents*			
Cooke 1026*	lb.	——	2.50
Lampblack No. 10*	lb.	.06	.09
Mapico Black Iron Oxide* (50 lb. bags)	lb.	.14¼	.14½
Pure Black Iron Oxide	lb.	.14¼	.14½

Blue

Akron Masterbatches*	lb.	2.23	2.78
Toners*	lb.	2.30	6.35
Blue Powders	lb.	2.20	3.75
Cooke M.B. Blue*	lb.	2.20	3.75
Disco Blues	lb.	2.20	3.45
Monastral Rubber Blue CPL*	lb.	1.53	1.95
PCD, Dispersed*	lb.	——	2.55
Peacoline Blue*	lb.	——	3.85
Ramapo Blue*	lb.	2.75	3.00
Rubber Blue GD* (Disp.)	lb.	——	4.75
Rubber Blue X-1999*	lb.	——	1.90
Rubber Dispersed Blues	lb.	2.52	2.78
Solfast Sky Blue*	lb.	3.00	3.60
Stan-Tone MBS*	lb.	1.55	4.55
GPE*	lb.	——	2.50
PC*	lb.	1.40	1.80
Ultramarine	lb.	.14	.30
Vansul Blue M.B.*	lb.	.95	2.60

Brown

Brown Iron Oxide	lb.	.15¼	.15½
Mapico Brown* (50 lb. bags)	lb.	.15¼	.15½
Stan-Tone GPE*	lb.	——	3.00
Vansul Brown M.B.* (Organic)	lb.	——	2.15

Green

Akron Masterbatches*	lb.	1.38	3.08
Toners*	lb.	1.35	4.95
Cooke M.B. Green*	lb.	1.60	2.80
1013*	lb.	——	2.80
Disco Greens	lb.	1.55	2.80
Green Powders	lb.	1.35	3.95
Monastral Rubber Green GSD* (Dispersed)	lb.	——	2.80
GSL*	lb.	1.70	2.20
Permansa Green CP-594*	lb.	——	1.35
Pigment Green B*	lb.	1.45	1.53
GL-652D*	lb.	.90	.95
Ramapo Green*	lb.	——	3.50
Rubber Dispersed Greens	lb.	1.23	3.08
Rubber Green FD* (Disp.)	lb.	——	2.05
Rubber Green X-1292*	lb.	——	1.75
Solfast Green*	lb.	——	3.95
Stan-Tone MBS*	lb.	1.55	3.35
GPE*	lb.	3.00	4.50
PC*	lb.	1.70	3.80
Vansul Green M.B.*	lb.	1.05	2.90

Maroon

Akron Masterbatches*	lb.	——	4.10
Toners*	lb.	2.00	4.00
Pyrolux Maroon*	lb.	——	3.65
Vansul Maroon M.B.*	lb.	——	3.35

Orange

Akron Masterbatches*	lb.	2.42	2.77
Toners*	lb.	2.82	4.00
Benzidene Orange	lb.	——	3.10
Cooke MB*	lb.	2.25	2.35
1021*	lb.	——	2.25
Dianisidine Orange*	lb.	——	2.70
Disco Oranges	lb.	2.30	2.85
Mercadium X-2667*	lb.	——	1.61
Molybdate Orange	lb.	——	.48
Oswego Orange X2065*	lb.	——	3.15
Rubber Orange OD* (Disp.)	lb.	——	2.25
Stan-Tone Cadmium Dry*	lb.	2.10	2.20
Cadmium Paste*	lb.	2.47	3.20
GPE*	lb.	1.20	4.35
PC*	lb.	.75	2.75
Vansul Orange M.B.*	lb.	2.40	2.45

Red

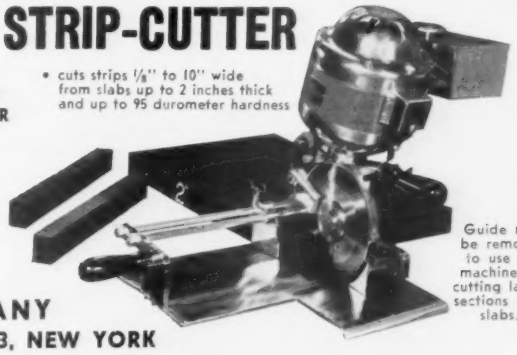
Akron Masterbatches*	lb.	1.00	3.53
Toners*	lb.	.88	5.60
Arcturus Reds*	lb.	——	1.20
Antimony Trisulfide	lb.	.72	.78
R.M.P. Sulfur Free*	lb.	——	.78
R.M.P. No. 3*	lb.	——	.72
Brilliant Toning Reds*	lb.	1.65	1.90
Cadmolith Red* (dms.)	lb.	1.94	2.87
Cooke M.B. Red*	lb.	1.05	3.25
1010*	lb.	——	1.75
Disco Reds	lb.	1.05	3.25
Graphic Red* (dlvd.)	lb.	.93	.98
Kroma Reds*	lb.	.14	.15
Lake Red C*	lb.	——	1.20
Mapico Reds* (50 lb. bags)	lb.	.13¾	.14
Mercadium X-2668 Light*	lb.	——	1.68
X-2669 Medium Light*	lb.	——	1.76
X-2670 Medium*	lb.	——	1.83
X-2671 Dark*	lb.	——	1.91

New! — a HEAVY-DUTY PORTABLE **RUBBER STRIP-CUTTER**

EASTMAN MODEL **RS-75** STRIP CUTTER

This newly developed strip-cutter, powered by a compact one-horsepower motor, makes it simple and easy to cut perfectly square strips within .010". Blade edge and gauge are continually moistened for easy cutting. Knife is automatically sharpened while cutting. Many other fine features.

• cuts strips 1/8" to 10" wide from slabs up to 2 inches thick and up to 95 durometer hardness



Guide may be removed to use the machine for cutting larger sections from slabs.

Skivers, Straight-Knife and regular Round-Knife machines also available.

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For Rubber Testing and Production

"DUMBELL" Test Strip Die D412(SIT)

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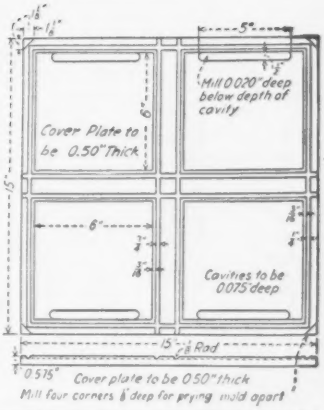
1" and 2" Centers

MALLET HANDLE DUMBELL DIE

For making tensile test samples, we make many types of slab molds. One is detailed at the right. These are plain or chrome finished. We usually stock molds for making adhesion, abrasion, flexing, compression and rebound test samples, but supply special molds promptly. We also furnish hand-forged tensile dies for cutting regular or tear test samples.

SLAB MOLD D15-41



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BRATEX RUBBER HOLLAND

You'll be adding up extra profits for yourself with the time and money you save by using Bratex. It's always pliable, either in hot or cold processing, and its clean peeling features save time and work. You'll find it easier to use because it is non-flaking and never loses its outstanding surface gloss. Available in 20" or 40" widths, 100 and 250 yard rolls, or made up to your own specifications.

THE **HOLLISTON MILLS,** INC. NORWOOD, MASS

NEW YORK • CHICAGO • PHILADELPHIA • MILWAUKEE • SAN FRANCISCO

COLORING AGENTS (Cont'd)

Red (Cont'd)

Oximony Red Iron Oxide	lb.	.12¼	.13
Polaris Red*	lb.	—	1.65
Recco Red Oxide*	lb.	.12	.13
Red Iron Oxide, Light	lb.	.13¾	.14
Red Powders	lb.	—	4.40
Rubber Dispersed Reds	lb.	1.47	3.58
Rubber Red PBD* (Disp.)	lb.	—	2.05
2BD, Dispersed*	lb.	—	2.00
2BL*	lb.	—	1.24
PBL*	lb.	—	1.24
Rubanox Reds*	lb.	1.40	1.50
Rubber Red CP-339* (dlvd.)	lb.	—	1.10
Rubber Red X-1148*	lb.	—	.93
Solfast Red*	lb.	1.40	1.50
Stan-Tone MBS*	lb.	1.20	3.55
GPE*	lb.	1.65	2.00
PC*	lb.	1.30	2.50
PDS*	lb.	1.40	1.55
PVC*	lb.	1.65	1.90
Vansul Red M.B.*	lb.	1.00	3.35
Watchung Red*	lb.	1.63	1.90

Tan

Mapico Tan 15* (50 lb. bags)	lb.	.22¾	.2300
20* (50 lb. bags)	lb.	.22¾	.2300

White—Lithopone

Eagle-Picher*	lb.	.0800	.0975
Permolith*	lb.	.0837½	.0912½
Sunolith*	lb.	.0800	.0875

White—Titanium Pigments

Horse Head Anatase Grades*	lb.	.25½	.26½
Rutile Grades*	lb.	.25½	.26½
Stan-Tone PC*	lb.	—	.55
Ti-Cal*	lb.	.09	.09¾
R-22*, R-25*, R-27*, R-30*	lb.	.09⅜	.09⅞
R-60*	lb.	.09⅜	.10⅜
Ti-Pure*	lb.	.24½	.27½
Anatase Grades*	lb.	.25½	.26½
R-100*, R-500*	lb.	.27½	.28½
Titanox A*—all grades (dlvd.)	lb.	.24½	.25½
C-50* (dlvd.)	lb.	.13⅜	.14⅜
RA* (dlvd.)	lb.	.26½	.27½
RA-10* (dlvd.)	lb.	.26½	.27½
RA-NC* (dlvd.)	lb.	.26½	.27½
RC* (dlvd.)	lb.	.09¾	.09¾
RC-HT* (dlvd.)	lb.	.09	.09½
Unitane O-110*	lb.	.25½	.26½
O-220*	lb.	.25½	.26½
O-310*	lb.	.25½	.26½
O-410*	lb.	.25½	.26½
OR-150*	lb.	.27½	.28½
OR-250*	lb.	.27½	.28½
OR-340*	lb.	.27½	.28½
OR-342*	lb.	.27½	.28½
OR-350*	lb.	.27½	.28½
OR-540*	lb.	.27½	.28½
OR-640*	lb.	.27½	.28½
Zopaque*	lb.	.24½	.25½
R*	lb.	.26½	.27½

White—Zinc Oxide (American Process)

AZO-DOX 44, 45	lb.	.1450	.1550
AZO-ZZZ 11* (22*, 33*, 44*, 55*)	lb.	.1450	.1550
Eagle-Picher AAA*	lb.	1450	.1550
Horse Head Special*	lb.	.1450	.1550
XX*	lb.	.1450	.1550
Protox 166*	lb.	.1450	.1550
167*	lb.	.1450	.1550
267* (pelleted)	lb.	.1450	.1550
St. Joe Black Label*	lb.	.1450	.1550
Green Label*	lb.	.1450	.1550
Red Label*	lb.	.1450	.1550
Pelleted	lb.	.1450	.1550

White—Zinc Oxide (Dispersed)

Dispersed Zinc Oxide	lb.	—	.13

White—Zinc Oxide (French Process)

AZO-ZZZ 66	lb.	.1450	.1550
Florence Green Seal*	lb.	.1625	.1725
Red Seal*	lb.	.1575	.1675
White Seal*	lb.	.1675	.1775
Kadox 25*	lb.	.1675	.1775
15*, 17*, 72* & 515	lb.	.1450	.1550
Protox 168*	lb.	.1450	.1550
169*	lb.	.1450	.1550
268* (pelleted)	lb.	.1450	.1550
U.S.P. (cartons)	lb.	.1775	.1875
XX-78*	lb.	.1450	.1550

White—Zinc Sulfide

Cryptone ZS*	lb.	.2530	.2630
Lehigh 35%*	lb.	.1550	.1650
50%*	lb.	.1585	.1685

COLORING AGENTS (Cont'd)

Yellow

Akron Masterbatch*	lb.	1.12	2.18
Toners*	lb.	2.10	6.00
Benzidene-Lightfast	lb.	3.25	5.10
Benzidine Yellow	lb.	1.41	2.55
Cadmolith Yellow (dms.)	lb.	1.12	1.20
Chrome Yellow	lb.	—	.35
Cooke M.B. Yellow 405*	lb.	2.15	2.75
105*	lb.	—	2.15
Disco Yellows	lb.	2.05	3.95
Iron Oxide, Pure Light Shades	lb.	.12	.12¼
Dark Shades	lb.	.11½	.11¾
Mapico Yellow* (50 lb. bags)	lb.	.12	.12¼
Rubber Dispersed Yellows	lb.	1.27	2.13
Rubber Yellow GD* (disp.)	lb.	—	2.25
GL*	lb.	—	1.68
Rubber Yellow X-1940*	lb.	—	2.35
Stan-Tone Cadmium Dry*	lb.	2.80	3.05
Cadmium Paste*	lb.	1.63	1.90
MBS*	lb.	1.30	2.20
GPE*	lb.	4.25	4.50
PC*	lb.	.55	3.40
Sumatra Yellow X-1940*	lb.	—	2.45
Toluidine Yellow	lb.	1.41	2.20
YL-660 D*	lb.	1.25	1.35
Oximony Iron Oxide	lb.	.12¼	.13
Vansul Yellow M.B.*	lb.	1.00	2.00
Yellow Powders	lb.	2.00	5.00
Zinc Yellow	lb.	.29	3.48

DISPERSING AGENTS

Anchoid*(†)	lb.	.24	.25
Anhydrapent*	lb.	.56	.59
Armeen 18*	lb.	.39	.45
Blancol*	lb.	—	.15¼
Darvan No. 1*, No. 2*, No. 3*	lb.	.22	.30
Daxad 11* (21*, 23*)	lb.	.08	.30
Diethanolamine (dms., dlvd.)	lb.	.24½	.27½
Dispersaid*	lb.	1.25	1.35
Emcol K-8300* (dms.)	lb.	.14	.18
P10-59	lb.	.32	—
5120	lb.	.31	—
5138	lb.	.31	—
Emulphor ON-870*	lb.	—	.55
Furala*	lb.	.06½	.07½
Halloid*	lb.	.04½	.05½
Hycryl A-1000*	lb.	.09	.09½
Igepal CO-630*	lb.	—	.29
Igepon T-73*	lb.	—	.29½
Kyro EO* (dms.)	lb.	—	.29¾
Leonil SA*	lb.	—	.55
Lomar PW*	lb.	—	.18
Marasperse C*	lb.	.06¼	.06¾
CB*	lb.	.13	.15
N*	lb.	.09½	.10½
Monoethanolamine (dms., dlvd.)	lb.	.25	.28
Naccotan A*	lb.	.16½	.17
Nekal BA-75*	lb.	—	.40
BX-78*	lb.	—	.64
Nopco 1187-X*	lb.	.15	.16
Pluronic F68*	lb.	.38½	.44
Polyfon*	lb.	.08	.09
R & R 551*	lb.	—	.28
Rubbex*	lb.	.247	.277
Stablex B*	lb.	.50	.95
Stan-Chem BQC*	lb.	.12¼	.17¼
1067*	lb.	—	.13½
1471*	lb.	.1687	.2187
2251*	lb.	.12¼	.17¼
Trenamine D-25*	lb.	.32½	.36
Triethanolamine (dms., dlvd.)	lb.	.22	.25
Yelkin TT* (and TTS*)	lb.	.13	.16

EXTENDERS

Areco 1071-13B*	lb.	.14½	.15½
1073-18B*	lb.	.13½	.14½
1294-36B*	lb.	.11½	.12½
Car-Bel-Ex-A* (and B*)	lb.	—	.14
Extender 600*	lb.	—	.1765
Facile Gum 4A*	lb.	.48	.50
Millex*	lb.	—	.07
W*	lb.	—	.07
Nopco 2271*	lb.	.15½	.16½
Polyco 418*	lb.	.17	.18
PR-162 Latex Extender*	lb.	—	.182
Solvitose HDF*	lb.	.22	.25
Synprolac*	lb.	.16	.23
Synprowax*	lb.	—	.23
Vistanex MM Grades*	lb.	—	.35

FILLERS (Inert and Reinforcing)

Abrasives			
Carbonite*	lb.	.21½	1.35
Lionite*	lb.	.16	1.27
Pumice	lb.	.03	.05
Walnut Shell Grits	lb.	.05	.08
Aluminum Hydrate	lb.	.0850	.1200
Kaiser Alumina*	lb.	.026	.059
Aluminum Silicate			
AFD*	ton	29.50	36.00
Aluminum Flake*	ton	29.50	36.00
Marter White*	ton	18.50	30.00
Barium Carbonate (l.c.l.)	ton	101.50	121.50

FILLERS (Cont'd)

Barytes			
No. 1 Floated, White*	ton	45.00	65.10
No. 2 Floated, Un-bleached*	ton	43.00	63.10
No. 22 Barytes* (c.l.)	ton	—	30.00
No. 3805 Barytes*	ton	22.00	26.75
Foam A*	ton	—	55.00
Sparmite*	ton	80.00	85.00
XIOR*	ton	80.00	85.00
Bentonite (c.l.)	ton	—	13.50
Argosite Clay* (c.l.)	ton	—	12.50
Bennett Clay* (c.l.)	ton	—	32.50
SPV Volclay* (c.l.)	ton	—	12.50
White Hi-Gel*	ton	—	65.90
Blanc Fixe	ton	125.00	142.00
Calcium Carbonate			
Atomite* (c.l.)	ton	—	32.50
B.I. White No. 1 (c.l.)	ton	—	9.00
Calcene NC*	ton	80.00	100.00
TM*	ton	82.50	102.50
Calwhite*	ton	—	20.00
Camel-Carb*	ton	—	12.00
Camel-Tex*	ton	—	20.00
Camel-Wite*	ton	—	32.50
Duramite*	ton	—	20.00
Gamaco* (c.l.)	ton	—	32.50
Georgia Marble 5-25* (c.l.)	ton	—	20.00
No. 10 White* (c.l.)	ton	—	11.00
Kalite*	ton	52.50	67.50
Laminar*	ton	—	30.00
Lesamite* (c.l.)	ton	—	27.50
Lorite*	ton	30.00	36.00
Millical*	ton	38.00	53.00
Multifex MM*	ton	117.50	137.50
Non-Fer-Al*	ton	35.00	50.00
Purecal M*	ton	56.75	80.75
SC* (and T*)	ton	110.00	125.00
U*	ton	120.00	135.00
Rambo No. 1*	ton	—	10.50
Snowflake*	ton	17.00	20.00
Super Multifex*	ton	167.50	187.50
Surfex*	ton	42.00	57.00
Suspenso*	ton	38.00	43.00
Witcarb Reg.*	ton	56.75	85.00
P*	ton	110.00	140.00
R*	ton	120.00	150.00
RC*	ton	110.00	140.00
York White*	ton	—	10.50
Calcium Silicate			
Silene EF*	lb.	.06	.07
Calcium Sulfate, Anhydrous			
Snow White Filler*	ton	—	21.00
Calcium Sulfate Hydrous			
Terra Alba No. 1*	ton	—	17.00
Chalk Whiting (l.c.l.)	lb.	.01½	.01¾
Recco Paris Whiting*	ton	—	35.00
OMYA Whiting*	ton	—	30.00
Clay			
Afton Clay*	ton	12.00	35.50
Aiken Clay*	ton	14.50	—
Alsilite* (c.l.)	ton	30.00	45.00
Aluminum Flake*	ton	25.50	28.50
Buca* (c.l.)	ton	—	45.00
Burgess No. 20*	ton	—	35.00
No. 30*	ton	—	37.00
Burgess Iceberg*	ton	—	50.00
Catalpo* (c.l.)	ton	—	35.00
Champion*	ton	—	14.50
Crown*	ton	—	14.00
Dixie* (c.l.)	ton	—	14.50
Franklin Clay—R* (c.l.)	ton	15.00	39.00
G. K. Soft*	ton	11.00	28.00
Harwick Clays*	ton	14.50	57.00
Hi-White R*	ton	—	13.50
Kaolloid Clay* (c.l.)	ton	—	10.50
LGB*	ton	17.50	22.50
LGP*	ton	20.00	25.00
McNamee* (c.l.)	ton	—	14.50
Natka 1200 (c.l.)	ton	—	13.00
Par* (c.l.)	ton	—	13.00
Paragon*	ton	14.50	19.50
Pigment 5*	ton	27.50	34.50
33*	ton	—	37.00
Recco* (c.l.)	ton	—	14.00
Swanee Clay*	ton	—	12.50
Snobrite*	ton	—	12.50
Suprex*	ton	14.50	19.50
Whitetex* (c.l.)	ton	—	50.00
4200 Clay*	ton	13.00	—
Diatomaceous Earth	ton	30.00	50.00
Kaylorite* (c.l.)	ton	—	30.00
Lorite*	ton	—	36.00
Flock			
Cotton (White)	lb.	.28	.32
Colored	lb.	.11	.13½
Filfloc F 40-9000*	lb.	—	.13
F 6000*	lb.	—	.36
Polycel*	ton	110.00	210.00
Rayon, Bleached or Dyed	lb.	.75	1.20
Rayon, Grey	lb.	—	.18
Rayon, Pink	lb.	—	.20
Solka-Floc* (l.c.l.)	lb.	.07	.16
Glue, Amber	lb.	.17	.19
Ground Softwood Bark Silvacon* (c.l.)	ton	55.00	100.00
Leather			
Flour (dust)	lb.	.12	.15
Shredded	lb.	.05	.17
Lignin	lb.	.06	.08
Indulin*	lb.	.06	.08

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Limestone, Pulverized	ton	3.00	- 5.00
Asbestol Regular*	ton	27.00	- 29.00
Asbestol Superfine*	ton	32.00	- 34.00
Georgia Marble No. 10*	ton	——	- 11.00
Industrial Filler No. 100*	ton	——	- 5.75
Micro Velva A*	ton	49.00	- 51.00
L*	ton	57.00	- 59.00
No. 1 White*	ton	——	- 10.00
Magnesium Carbonate	lb.	.12½	- .15
K & M Clearcarb*	lb.	——	- .14
Technical* (c.l., eqld.)	lb.	.10½	- .12
Marinco CL*	lb.	——	- .1[illegible]
Magnesium Silicate (see Talc)			
Mica	lb.	.01¼	- .07¾
Concord*	lb.	.08	- .08¾
Micro-Mica*	lb.	.08	- .08¾
Mineralite* (c.l.)	ton	40.00	- 85.00
Silversheen*	lb.	.08	- .08¾
Triple A Mica* (c.l.)	ton	——	- 30.00
Vermiculite*	lb.	——	- .11
Wet Ground Biotite Mica	lb.	.06½	- .07¼
Wet Ground Mica No. 160*	lb.	.08	- .08¾
Pecan Shell Flour Stan Shell*	ton	45.00	- 75.00
Pyrophyllite No. 261*	ton	——	- 11.50
Pyrax A* (c.l.)	ton	14.50	- 15.00
WA* (c.l.)	ton	17.00	- 17.50
Sawdust, Graded	ton	14.00	- 35.00
Silica	ton	16.00	- 27.00
Extra Fine (bags) (c.l.)	ton	——	- 43.00
Slate, Powdered (l.c.l.)	ton	15.00	- 20.00
Lo-Micron Slate Flour*	lb.	——	- .04½
No. 133 Slate Flour*	ton	——	- 4.55
Sodium Silico Aluminate Zeolex 23*	ton	120.00	-140.00
Talc (Magnesium Silicate) Asbestol Regular*	ton	——	- 27.00
Eastern RC-500*	ton	——	- 32.00
No. 41*	ton	——	- 19.70
No. 549*	ton	——	- 63.00
French*	ton	——	- 59.00
L.S. Silver*	ton	33.75	- 38.75
No. 367*	ton	——	- 13.00
No. 1600*	ton	——	- 70.60
No. 1768*	ton	——	- 13.00
Nytal 200* (c.l.)	ton	——	- 28.00
300* (c.l.)	ton	——	- 38.00
Sierra Fibrene C-400*	ton	33.00	- 38.00
Supreme 325*	ton	46.25	- 57.25
Sierra White*	ton	20.75	- 31.75
Soapstone*	ton	——	- 13.00
Walnut Shell Flour	ton	55.00	-100.00
Stan-Shell*	ton	50.00	- 84.00
Whiting, Commercial	ton	——	- 7.50
Allied Whiting*	ton	10.50	- 21.50
Camel-Carb*	ton	——	- 10.00
Calwhite (c.l.)	ton	——	- 20.00
C-C-O White*	ton	——	- 22.00
Georgia Marble No. 15*	ton	——	- 20.00
No. 16*	ton	——	- 20.00
Piqua No. 1 YAA* (c.l.)	ton	1.00	- 10.00
No. 2 LS* (c.l.)	ton	1.00	- 10.00
Snowflake* (c.l.)	ton	——	- 20.00
Stan-White 325*	ton	11.50	- 14.10
Veroc* (c.l.)	ton	——	- 10.50
Welco* (c.l.)	ton	——	- 10.50
York White R* (c.l.)	ton	——	- 10.00
Wood Flour	ton	31.50	- 48.00

FINISHING MATERIALS, SURFACE

Beaco Finishes*	gal.	2.10	- 2.35
Black Out*	gal.	4.50	- 8.00
Shellac, Orange Gum	lb.	.50	- .60
VanWax*	gal.	1.45	- 1.50

FLAME RETARDANTS

Celluflex CEF* (dms.)	lb.	——	- .65
Chlorowax 40*	lb.	.15¼	- .17¾
50*	lb.	.16¾	- .17¾
70*	lb.	.18½	- .20
Halowax*	lb.	.36	- .46
Zinc Borate 3167*	lb.	.1920	- .2020
Zyrox Compounds*	lb.	.38	- .95½

LATEX MODIFIERS

Ludox	lb.	.15	- .16¾
OPD-101*	lb.	——	- .28
Piccopale A-1 Emulsion	lb.	.086	- .107
Ubatol U-2001* (dms.)	gal.	1.84	- 1.87

LUBRICANTS, MOLD

Akro Gel*	lb.	——	- .165
Alipal CO-433*	lb.	——	- .20
CO-436*	lb.	——	- .24
Aluminum Stearate Crown Brand*	lb.	.37	- .42
Amine, Mixed Crude*	lb.	.19	- .25
Aquadag*	lb.	3.50	- 4.00
Aquarex D*	lb.	——	- .78
L*	lb.	——	- .94
ME*	lb.	——	- .80
MDL*	lb.	——	- .33
WAQ*	lb.	——	- .22
Armeen HT*	lb.	.34	- .40
180*	lb.	.52	- .56

LUBRICANTS, MOLD (Cont'd)

Armid HT (flaked)*	lb.	.42	- .46
0*	lb.	.39	- .41
Borax, Granular (l.c.l.)	ton	89.00	- 94.00
Carbowax 4000*	lb.	.31	- .32
CD Mold Release B*	gal.	5.00	- ——
B-2*	gal.	5.00	- ——
Colite Concentrate* (dms.)	gal.	.90	- 1.15
Colite D43D*	gal.	1.15	- 1.40
Concentrex*	lb.	——	- .25
Dag Dispersions No. 197*	lb.	1.85	- 2.90
D.C. 7 Compound*	lb.	5.13	- 6.50
D.C. Emulsion No. 7*	lb.	1.59	- 2.07
No. 8*	lb.	1.22	- 1.76
No. 35*	lb.	1.22	- 1.76
No. 35A*	lb.	1.22	- 1.76
No. 35B*	lb.	1.22	- 1.76
No. 36*	lb.	1.22	- 1.76
D.C. Mold Release Fluid*	lb.	3.14	- 4.75
Dri-Lube*	lb.	——	- .22
Emulsion Lubricant A80*	lb.	——	- 1.80
45*	lb.	——	- 1.80
G-E Silicone Emulsion SM-55*	lb.	1.22	- 1.76
SM-61*	lb.	1.22	- 1.76
SM-62*	lb.	1.22	- 1.76
G-E Silicone Fluid SF-93*	lb.	3.14	- 4.25
SF-96*	lb.	3.14	- 4.25
Glydag G*	lb.	1.30	- 2.45
Hawkeye Flake* (dlvd.)	lb.	.15	- .15¾
HSC No. 35*	lb.	1.22	- 2.46
No. 515	lb.	1.22	- 2.46
Igepal CO-430*	lb.	——	- .29
CO-630*	lb.	——	- .29
CO-530*	lb.	——	- .29
Igepon AP-78*	lb.	——	- .48
T-33*	lb.	——	- .21
T-51*	lb.	——	- .13½
Kokobace R*	lb.	.17½	- .18½
Lubrex	lb.	.25	- .30
Lubri-Flo*	gal.	10.00	- 12.00
Migralube*	lb.	——	- .35
ML-1027-2C*	gal.	——	- 2.15
ML-1028-2C*	gal.	——	- 2.15
Mold Lubricant No. 72 Conc.* (dms.)	gal.	——	- 1.90
Mold Lubricant No. 735* (dms.)	gal.	——	- 1.25
No. 769* (dms.)	gal.	——	- 1.20
No. 825* (dms.)	gal.	——	- 2.00
No. 856* (dms.)	gal.	——	- 1.90
No. 880* (dms.)	gal.	——	- 1.19
No. 887* (dms.)	gal.	——	- 1.80
No. 896* (dms.)	gal.	——	- 1.28
No. 935* (dms.)	gal.	——	- 1.56
No. 956* (dms.)	gal.	——	- 2.50
No. 965* (dms.)	gal.	——	- 2.15
No. 967* (dms.)	gal.	——	- 2.40
No. 969* (dms.)	gal.	——	- 1.50
No. 975* (dms.)	gal.	——	- 2.85
No. 980* (dms.)	gal.	——	- 1.53
No. 987* (dms.)	gal.	——	- 2.45
Moldeze No. 3*	gal.	——	- 4.95
Mold-Brite*	gal.	——	- 1.50
Monopole Oil MD*	lb.	——	- .16
Olate Flakes*	lb.	.22	- .23
Orvus WA Paste* (dms.)	lb.	——	- .22
Plaskon Polyethylene S*	lb.	.32	- .47
Poly-Brite PE-20	lb.	.28	- .42
600	lb.	.42	- .58
Poly-Cone 125X	lb.	1.20	- 1.40
1,000	lb.	.93	- 1.06
Polyglycol 15-200*	lb.	.25	- .28¾
E4000*	lb.	.31	- .37
Prodag*	lb.	.28	- .42
Purity Flake* (dlvd.)	lb.	.18	- .19¾
Rubber-Flo*	gal.	1.25	- 2.00
Rubber-Glo*	gal.	——	- .94
Rusco Mold Paste*	lb.	——	- .25
Sericite* (l.c.l.)	ton	65.00	- 75.00
Silicone Oil A145*	lb.	3.18	- 3.61
Silrex (dms.)	lb.	——	- .65
A65*	lb.	2.50	- 2.75
Soybean Lecithin	lb.	.13	- .17
Thermalube*	lb.	——	- .13¾
UC Silicone L-45*	lb.	3.14	- 4.75
L-522*	lb.	3.05	- 4.05
LE-45*	lb.	1.22	- 1.70
LE-450*	lb.	1.22	- 1.70
Ucon Lubricants*	lb.	.26¾	- .27¾
Ulco Mold Soap*	lb.	.15	- .29

LUBRICANTS, RUBBER

Diglycol Stearate Neutral (and SE) (dms.)	lb.	——	- .25
Extrud-o-Lube*	gal.	1.33	- 1.54
G.B. Naphthenic Neutrals*	gal.	.11	- .18
Ivory Chips*	lb.	.18¼	- .19¼
Latex-Lube GR* (dlvd.)	lb.	.19¼	- .20
No. 82-A* (450 lb. dms.)	lb.	——	- .08½
Propylene Stearate (dms.)	lb.	.35	- .60

LUBRICANTS, RUBBER SURFACE

Barium Stearate	lb.	.41	- .46
Calcium Stearate	lb.	.39	- .44
Crown Brand*	lb.	.37	- .42
D.C. 7 Compound*	lb.	5.13	- 6.50
D.C. 200 Fluid*	lb.	3.14	- 4.75
ELA*	lb.	——	- .82
G-E Silicone Fluid SF-92*	lb.	3.14	- 4.25
Glycerized Lubricant*	gal.	1.25	- 1.48
Glydag B*	lb.	1.50	- 2.10
G*	lb.	1.30	- 2.45

LUBRICANTS, RUBBER SURFACE (Cont'd)

Glyso-Lube* (dms.)	lb.	——	- .14
No. 3* (dms.)	lb.	——	- .14
HSC No. 35*	lb.	1.28	- 1.34
No. 515*	lb.	1.28	- 1.34
Hydro-Zinc*	lb.	——	- .20
Latex-Lube Pigmented* (dlvd.)	lb.	.17¼	- .18¼
R-66*	lb.	——	- .16½
Liqni-Lube* (dlvd.)	lb.	——	- .16¾
N.F.* (dlvd.)	lb.	——	- .16¾
N.T.* (dlvd.)	lb.	——	- .16¾
Lubrex*	lb.	.25	- .30
Lubri-Cote	gal.	.86	- 1.00
Magnesium Stearate Crown Brand*	lb.	.40	- .45
Polyethylene Glycol	lb.	.22	- .26
Rubber Free (Concentrate)*	gal.	——	- 1.44
Jel*	lb.	.18	- .21½
Slab-Dip* (dms.)	lb.	——	- .15
Soybean Lecithin	lb.	.13	- .17
Stock-Lube*	lb.	——	- .19
UC Silicone L-45*	lb.	3.14	- 4.75
L-522*	lb.	3.05	- 4.05
LE-450*	lb.	1.22	- 1.70
Zinc Stearate	lb.	.41	- .46

MOLD CLEANERS

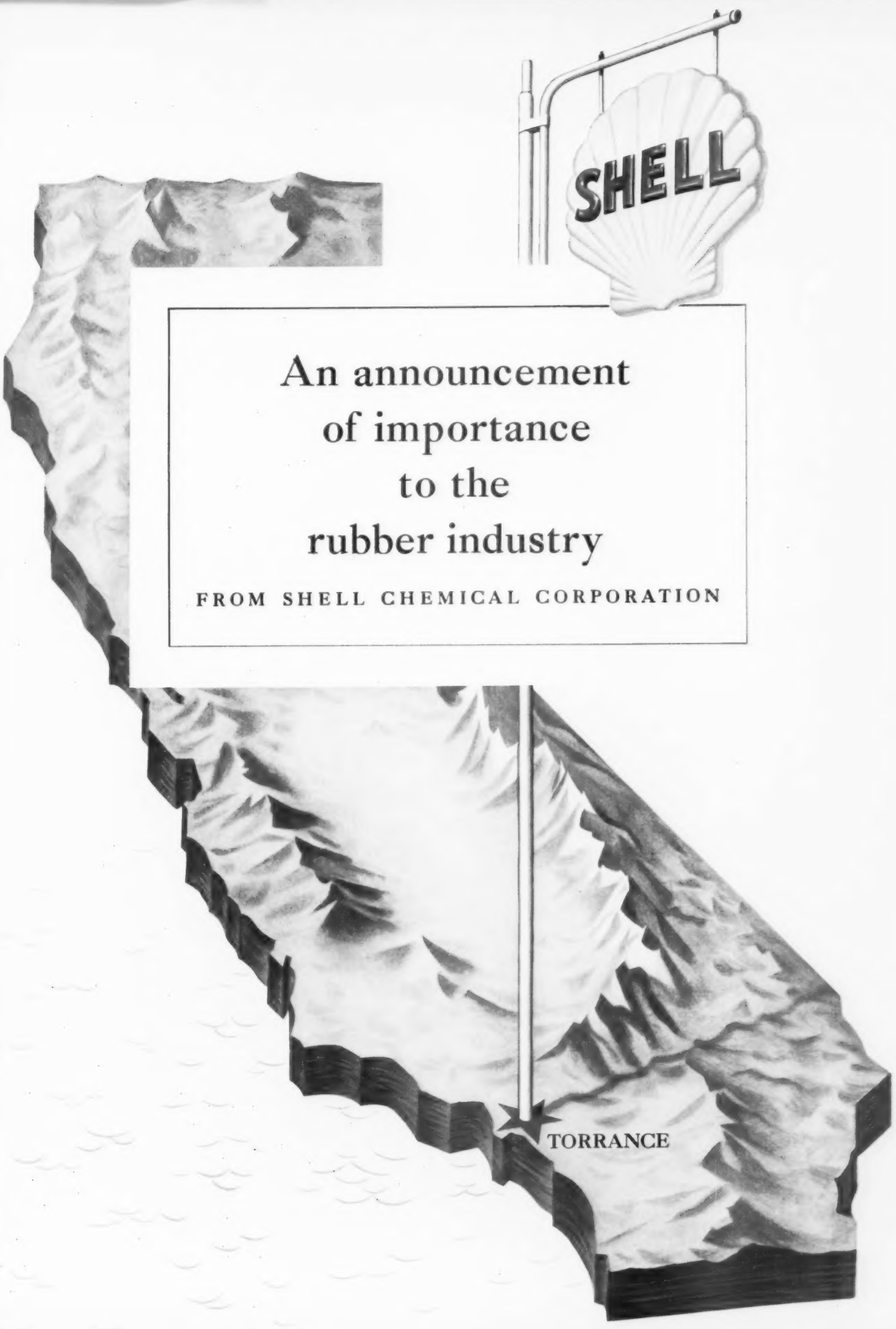
Actusol* (dlvd.)	gal.	1.45	- 1.65
Alkon* (dlvd.)	lb.	.16	- .16½
CA-301*	gal.	——	- 2.49
CA-302*	gal.	——	- 2.63
G-O 6910*	lb.	.38	- .40
Metso Anhydrous*	cwt.	5.70	- 7.95
Metso 99*	cwt.	5.00	- 7.25
200*	cwt.	6.70	- 8.95
Granular*	cwt.	4.45	- 6.70
Orvus Extra Granules*	lb.	.22½	- .23½
Rubber-Sol*	gal.	2.97	- 3.97
Sprex A.C.* (dlvd.)	lb.	.17¾	- .18¾
Zip Mold Cleaner*	gal.	.95	- 1.45

PEPTIZING AGENTS

Peptizer P-12*	lb.	.95	- 1.25
Pepton 22 Plasticizer*	lb.	.83	- .86
65*	lb.	1.23	- 1.26
65B*	lb.	.83	- .86
Pitt-Consol 620, 640	lb.	.37	- .42
RPA 2*	lb.	——	- .85
3*	lb.	——	- .51
3 Conc.*	lb.	——	- .85
5*	lb.	——	- .68
6*	lb.	——	- 1.66

PLASTICIZERS & SOFTENERS

Acto 500*	lb.	——	- .09
Adipol BCA*	lb.	.45	- .45½
2EH*	lb.	.42½	- .43¼
10A*	lb.	.42½	- .43½
ODY*	lb.	.45¼	- .46½
810*	lb.	.42½	- 45¼
XX*	lb.	.42½	- .43¼
Admex 562 (dms.)	lb.	.50¼	- .51¼
710 (dms.)	lb.	.35¼	- .36¼
711 (dms.)	lb.	.37¼	- .38¼
744 & 745 (dms.)	lb.	.41¼	- .42¼
760 (dms.)	lb.	.59¼	- .60¼
761 (dms.)	lb.	.46¼	- .47¼
Anhydrol 6990*	lb.	.51	- .56
Arneel SD*	lb.	.34	- .40
Arolene 1980* (c.l.)	lb.	——	- .10
Aromatic Plasticizer 10* (and 25*) (dms.)	lb.	.05	- .06½
Aromatic Tar	gal.	.0573	- .1973
Bardol*	lb.	.02¾	- .03¾
B*	lb.	.06¼	- .06½
Bayol D*	gal.	——	- .382
F*	gal.	——	- .52
Beeswax, Bleached	lb.	.76	- .79
Yellow Refined	lb.	.68	- .70
Bondogen*	lb.	.55½	- .60½
B.R.C. No. 20*	lb.	.0150	- .0175
No. 21*	lb.	.02¾	- .03
No. 22*	lb.	.02½	- .02¾
B.R.H. 2*	lb.	.0213	- .0351
BRS 700*	lb.	.0200	- .0285
B.K.T. 3*	lb.	.0180	- .0265
4*	lb.	.0250	- .0269
7*	lb.	.0300	- .0310
B.R.V.*	lb.	.0475	- .0565
Bunarex Resins*	lb.	.07	- .08
Bunatak AH*	lb.	——	- .09½
N*	lb.	——	- .31
U*	lb.	——	- .17¾
No. 90*	lb.	——	- .09
No. 210*	lb.	——	- .14
Butac*	lb.	.12½	- .13¼
Butyl Carbitol Perlargonate (dms.)	lb.	——	- .64½
Butyl Cellosolve Perlargonate (dms.)	lb.	——	- .68
Butyl Oleate	lb.	.25½	- .26½
Butyl Palmitate	lb.	——	- .26½
Butyl Stearate (dms.)	lb.	.25¼	- .27¼
Cabflex DDA*	lb.	.40	- .43½
DDP*	lb.	.29½	- .33
Di-BA*	lb.	.41	- .44½
Di-OA*	lb.	.40	- .43½
Di-OP*	lb.	.28½	- .32
Di-OZ*	lb.	.45½	- .49
DOA*	lb.	.40	- .43½
DOP*	lb.	.28½	- .32
HS-10	lb.	.44	- .47½
ODA*	lb.	.40	- .43½
ODP*	lb.	.29	- .32½
TCP*	lb.	.34½	- .38



An announcement of importance to the rubber industry

FROM SHELL CHEMICAL CORPORATION

Shell Synthetic Rubber is now available in the

FLOTAINER*

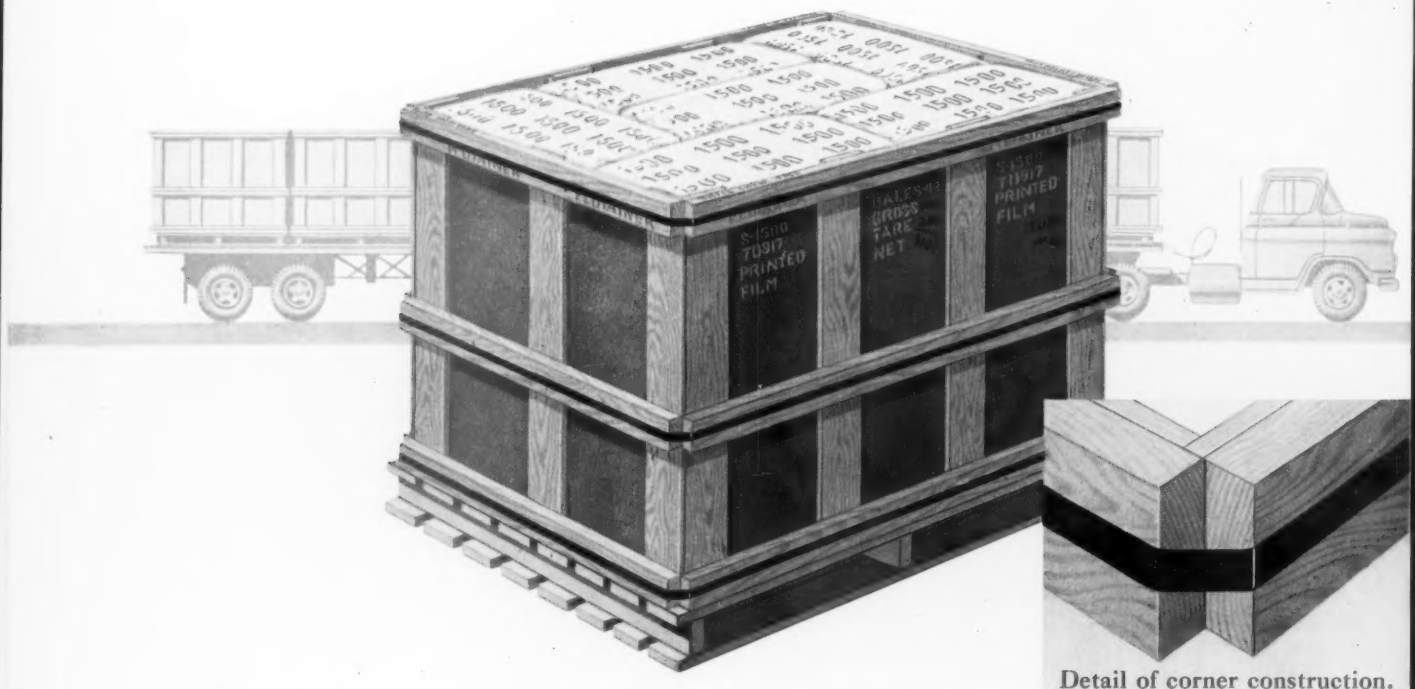
A practical answer to the cold flow problem in shipping and storing synthetic rubber

For many years industrial users of general-purpose synthetic rubber have fought handling, storage and product contamination problems resulting from cold flow.

Now—after months of actual on-the-job testing—Shell introduces the Flotainer*—a major step forward in the application of modern packaging and handling methods.

The FLOTAINER* is a strong, lightweight, steel-strapped wooden container reinforced at strategic points to withstand the heavy pressure of settling bales. By controlling cold flow, it prevents bale deformation and film rupture during the critical storage and shipping periods.

*Shell Chemical Trademark. Patents pending.



Ready for shipment. On its returnable pallet, the Flotainer contains 42 film-wrapped bales . . . 1½ tons of Shell synthetic rubber.

Detail of corner construction.
3 steel straps hold sides together.
3 snips . . . and the sides fall off.

Easy to unload. Standard fork-lift equipment unloads a flat-bed truck in less time than it takes to clear the gate house in some plants.

Easy to open. Sides and cardboard liner are easily removed. Side panels stack neatly for return trip.

Easy to store. Three-high stacking puts twenty tons of rubber on less than 100 square feet of floor space.

Easy to move. Pallet load retains compacted shape for some time after removal of sides. Nothing but the pallet and a single sheet of heavy paper goes to the Banbury room with the rubber.

En route by truck, Shell synthetic rubber in Flotainers leaves Shell's Torrance plant. Fifteen Flotainers—over 20 long tons of rubber—on a single flat-bed truck.

En route by freighter, a Flotainer loaded with Shell synthetic rubber is hoisted easily to the ship's hold for an overseas destination.

En route by railroad, Flotainers provide security against deformation and contamination in transit, simplify loading and unloading.

THE FLOTAINER was developed at Shell's Torrance, California, plant

Here Shell Chemical produces a wide range of butadiene-styrene synthetic rubbers. These include hot, cold, oil-extended and black masterbatch rubber, as well as hot and cold latices. Our Technical Service Laboratory is ready to work with you in determining which Shell rubber best serves your purposes.

Get the complete story about Shell synthetic rubber. Phone or write for a catalog—or visit us at Torrance, California.

SHELL CHEMICAL CORPORATION

Synthetic Rubber Sales Division
P.O. Box 216, Torrance, California
DAvis 3-3030 FAculty 1-2340

SHELL

PLASTICIZERS & SOFTENERS (Cont'd)

Califlux 510* (and 550*)	lb.	.03½	.03¾
G.P.*	lb.	.02¼	.02½
R-100*	lb.	.05½	.05¾
TT*	lb.	.0270	.0295
Candelilla Wax, Prime	lb.	.70	.74
Refined Light	lb.	.73	.78
Carbowax 4000* (dms.)	**lb.**	**.31**	**.32**
Carnauba Wax, Crude	lb.	.71	.77
Flaked	lb.	.72	1.55
Refined, Technical	lb.	.72	.80
Refined, Pure	lb.	.80	.86
Yellow	lb.	1.42	1.45
Celluflex* (dms.)			
112* (t.c., dlvd.)	lb.	——	.34½
179-A* (t.c., dlvd.)	lb.	——	.32½
179-C* (t.c., dlvd.)	lb.	——	.32½
179-EG* (t.c., dlvd.)	lb.	——	.32½
DBP* (t.c., dlvd.)	lb.	——	.30
DOP* (t.c., dlvd.)	lb.	——	.28½
TPP* (dms., eqld.)	lb.	——	.40
Ceresin Wax	lb.	.12	.30
Chlorowax 40*	**lb.**	**.15¼**	**.17¼**
50*	lb.	.16¾	.17¾
70*	lb.	.18½	.20
LV*	lb.	.17¼	.19¼
CTLA Polymer*	**gal.**	**.20**	**.30**
Cumar Resins*	lb.	.07	.19
Darex DBP*	lb.	.30	.33
DOP*	lb.	.30½	.33½
DIOP*	lb.	.30½	.33½
D.B.M.*	lb.	.32	.34¼
Decylbutyl Phthalate	lb.	.27	.29½
Degras, Common	**lb.**	——	**.14**
Diallyl Phthalate	lb.	.51½	.52½
Dibenzyl Sebacate	lb.	.88	.89½
Dibutoxyethyl Sebacate	**lb.**	——	**.56¼**
Dibutyl Phthalate	lb.	.32½	.33½
Dibutyl Sebacate	lb.	.64½	.66
Dicapryl Adipate	lb.	.42	.44
Dicapryl Phthalate	lb.	.29½	.31
Dicapryl Sebacate	**lb.**	**.58**	**.59½**
Di-CarbitolPhthalate(dms.)	lb.	.49	.49½
Dicyclohexyl Phthalate	lb.	.58¼	.59¼
Diethyl Phthalate	lb.	.31½	.32½
Di-2-ethylhexyl Phthalate	**lb.**	——	**.30½**
Dihexyl Adipate	lb.	.40	.42½
Dihexyl Phthalate	lb.	.30	.32½
Dihexyl Sebacate	lb.	.65	.74
Diisobutyl Azelate	**lb.**	——	**.47¼**
Di-iso-octyl Adipate	lb.	.40	.43½
Di-iso-octyl Phthalate t.c.)	lb.	.28	.31½
Dimethyl Phthalate	lb.	.32	.33
Dimethyl Sebacate	lb.	1.30	1.32
Dinonyl Adipate	**lb.**	**.44½**	**.4[illegible]**
Dinopol 235*	lb.	.36	.37
IDO*	lb.	.31	.32
MOP*	lb.	.31½	.32½
Dioctyl Adipate	lb.	.40	.42½
Dioctyl Phthalate (dms.)	lb.	.28	.31½
Dioctyl Sebacate (dms.)	lb.	.60	.63
D.I.O.P. (dms.)	**lb.**	**.31**	**.32**
Dipolymer Oil	**gal.**	**.33**	**.48**
Dispersing Oil No. 10*	**lb.**	**.06**	**.06¼**
Dutrex 6*	**gal.**	——	**.11**
15E*	**gal.**	——	**.10**
Elastex 10-P*	**lb.**	**.30½**	**.33½**
50-B*	lb.	.25	.28
DCHP*	lb.	.59	.60
Emulphor EL-719*	**lb.**	——	**.58**
Epoxy Plasticizer	**lb.**	**.33½**	**.36**
Drapex 3.2*	lb.	.39¼	.44
Drapex 4.4*	lb.	.37	.42
Esparto Wax	lb.	——	.55
Estac*	**lb.**	——	**.16**
Facile Gum 4A*	**lb.**	**.48**	**.50**
Flexol B-400*	**lb.**	**.27½**	**.28½**
DOP*	lb.	.33	.34
TOF*	lb.	.45½	.46½
3GH*	lb.	.46	.46¾
3GO*	lb.	.55	.55¾
4GO*	lb.	.35	.36
426*	lb.	.29½	.30½
Flexricin P-1*	**lb.**	——	**.32**
P-4*	lb.	——	.34¾
P-6*	lb.	——	.41½
P-8*	lb.	——	.34¾
Fortex A* (dms.)	**lb.**	**.12½**	**.14½**
Galex W-100*	**lb.**	**.15½**	**.19¾**
G.B. Asphaltic Flux*	gal.	.23	.25
G.B. Light Process Oil*	lb.	.0157	.0177
Medium Process Oil*	lb.	.03½	.03¾
G.B. Naphthenic Neutrals*	**lb.**	**.04½**	**.04¾**
Good-rite GP233*	**lb.**	**.40**	**.43½**
GP235*	lb.	.40	.43½
GP236*	lb.	.40	.43½
GP261*	lb.	.28	.31½
GP265*	lb.	.28½	.32
GP266*	lb.	.29	.32½
GP-266-BPA*	lb.	.29	.32½
Harflex 500* (dms.)	lb.	.31½	.34
HB20*	lb.	.15	.17
HB40*	lb.	.19	.22
Herron-H.T.*	**gal.**	**.16**	**.27**
Herron-Plas*	**lb.**	——	**.03¾**
Herron-Wax*	**lb.**	**.05¼**	**.06**
No. 23*	lb.	.08¼	.08¾
No. 24*	lb.	.07¼	.07¾
HSC No. 13*	**lb.**	**.25**	**.32**
No. 28 and 38*	lb.	.20	.27
Indonex 632½* (633½*, 634½*, 637½*)	**gal.**	**.12**	**.19**
Isooctyl Decyl Phthalate	lb.	.28½	.32
Kapsol*	**lb.**	**.35**	**.35½**
Kenflex*	**lb.**	**.18**	**.27**

PLASTICIZERS & SOFTENERS (Cont'd)

Kesscoflex 101* (dms.)	lb.	——	.37¾
103* (dms.)	lb.	——	.38
MCO* (dms.)	lb.	——	.35½
BCL* (dms.)	lb.	——	.37½
MCP* (dms.)	lb.	——	.41
BCP* (dms.)	lb.	——	.36
KP 23*	lb.	.31½	.32½
90*	lb.	.42½	.43½
140*	lb.	.48	.48½
201*	lb.	.58	.59
220* & 260*	lb.	.35½	.36½
666*	lb.	.59½	.60
Kremol 40*	**gal.**	**.36**	**.46**
50*	gal.	.39	.49
Kronisol* (dms.)	lb.	.33	.36
Kronitex AA* (dms.)	lb.	.35	.36
1* (dms.)	lb.	.35	.36
K-3*	lb.	.35	.36
MX*	lb.	.35	.36
Lanolin, Tech. Anhydrous	lb.	——	.20
Latex-Lube G.R.*	lb.	.19¼	.20
Lead Oleate	lb.	——	.29¼
Lindol* (dms., t.c.)	lb.	——	.32½
Locusol No. 1-6980*	lb.	.30	.34
2-Mercaptoethanol (dms.)	**lb.**	**1.25**	**1.50**
Methox*	lb.	.40½	.41
Methyl Laurate	**lb.**	**.25**	**.27**
Methyl Oleate	**lb.**	——	**.20**
Methyl Stearate (dms.)	**lb.**	——	**.30**
Monoplex DOS*	lb.	.59½	.60½
DBS*	lb.	.65½	.66½
S-70*	lb.	.41	.42
S-71*	lb.	.46½	.47½
Montan Wax, Crude	lb.	.26	.35
Flaked	lb.	.29	.40
Morflex*	**lb.**	**.32**	**.69½**
MR 2088* (dms.)	**lb.**	——	**.19**
Natac*	lb.	.12	.13
Nebony Resins* (dms.)	lb.	.04½	.05
Neolene 210* (t.c.)	**lb.**	——	**.16**
212* (t.c.)	**lb.**	——	**.14**
220* (t.c.)	**lb.**	——	**.15**
Nerium*	**lb.**	——	**.09**
Nevillac Resins* (dms.)	lb.	.31	.85
Neville LX-880* (dms.)	lb.	.12	.13½
LX-685* (dms.)	lb.	.12½	.17½
Neville Resins* (dms.)	lb.	.07¼	.20
Nevindene Resins* (dms.)	lb.	.16½	.20
Nevinol* (dms.)	**lb.**	——	**.24**
Nuba 1* (and 2*) (dms.)	**lb.**	**.06¼**	**.06¾**
No. 480 Oil Proof Resin*	**lb.**	——	**.18**
Ohopex Q10* (dms.)	lb.	.30½	.31½
R9* (dms.)	lb.	.37¼	.37¾
Ortho-Nitrobiphenyl	**lb.**	**.13**	**.15**
Ozokerite Wax, White and Yellow	lb.	.24	.31
Paradene Resins (dms.)	lb.	.07¼	.08
No. 2 Flaked	lb.	.08	.08½
Para Flux* (dms.)	gal.	.22	.25
2016* (dms.)	gal.	.22	.26
Para Lube* (l.c.l.)	lb.	.046	.048
Paraplex G-25*	lb.	.76	.77
G-40*	lb.	.50	.51
G-50*	lb.	.40¾	.41¾
G-53*	lb.	.45	.46
G-60* (and G-61*)	lb.	.35	.36
G-62*	lb.	.37	.38
Parmo*	**lb.**	**.06**	**.13½**
Pepton 22 Plasticizer*	lb.	.81	.84
PG-16*	**lb.**	——	**.35**
Philrich-5* (t.c.)	**gal.**	——	**.11**
Picco 10* (and 25*)	lb.	.15	.17
60* (and 75*)	lb.	.15	.17
100*	lb.	.15	.17
Piccocizer 30*	**lb.**	**.05½**	**.07**
Piccolastic A* (B*, C*, D* & E*)	**lb.**	**.28**	**.29**
FT* (FHF* & FX*)	lb.	.1815	.1965
T-135*	**lb.**	**.22¾**	**.23¾**
Piccolyte S Resins*	lb.	.20½	.22¾
Piccopale Resins*	lb.	.12	.13
Piccoumaron Resins*	lb.	.07	.24½
Pigmentar*	lb.	.0460	.0634
Pigmentaroil*	lb.	.0460	.0634
Plastac M*	**lb.**	——	**.09¼**
Plasticizer 2286*	**lb.**	——	**.26¼**
Plasticizer 4141*	lb.	.42½	.43½
Plasticizer DP-200, DP-250, DP-520*	lb.	.42¾	.46¾
Plasticizer LP*	lb.	——	.07
Plasticizer MP*	lb.	——	.08
Plasticizer MT-511*	lb.	——	.68¾
Plasticizer ODN*	lb.	.35	.41
Plasticizer SC*	lb.	.42½	.43½
Plasticizer W-13*	**lb.**	**.37**	**.38¾**
Plastoflex 3*	**lb.**	——	**.52**
52*	lb.	.37¾	.38¾
VS*	lb.	.41¾	.42¾
Plastogen*	lb.	.08¾	.09
Plastolein 9050* (c.l.)	lb.	.54½	.56½
9055*	lb.	.30½	.32½
9058*	lb.	.48	.50
9250*	lb.	.38¼	.40¼
9715*	lb.	.39	.40
Plastone	lb.	.23	.27
Polycizer 162*	lb.	.28	.31½
332*	lb.	.40	.42½
562*	lb.	.28½	.32
662*	lb.	.29	.32½
532 and 632*	lb.	.40	.42½
ED*	lb.	——	.51
Polyco 438*	**lb.**	**.34**	**.35**
Polymel C-130*	lb.	.13¾	.14¾
D*	lb.	.22½	.23½
6*	**lb.**	**.05¾**	**.07¼**
Poly-Sperse AP-2	lb.	.23	.29½
AP-300, LC-20	lb.	.26	.32½

PLASTICIZERS & SOFTENERS (Cont'd)

Poly-Sperse R-100	lb.	.17	.23¼
Process Oil C-255* (c.l.)	gal.	.27½	.29½
Propylene Stearate (dms.)	**lb.**	——	**.32**
PRR 1*	**gal.**	**.15**	**.35**
PT 67 Light Pine Oil* (dms.)	**gal.**	——	**.60**
101 Pine Tar Oil* (t.c., dms.)	gal.	.0460	.0634
400 Pine Tar* (600* & 800*) (t.c., dms.)	**lb.**	**.0460**	**.0634**
PX-104*	lb.	.30	.32½
PX-108*	lb.	.30½	.33
PX-138*	**lb.**	**.32½**	**.33½**
PX-208*	**lb.**	**.44½**	**.45½**
PX-238*	**lb.**	**.44½**	**.45½**
PX-404*	lb.	.66	.67
PX-438*	lb.	.60	.61
PX-800*	lb.	.34	.35
PX-917*	lb.	.36½	.37½
Reogen*	lb.	.14¼	.14½
465 Resin* (dms.)	lb.	.07½	.08
Resin C*	**lb.**	**.0225**	**.0310**
Resinex*	lb.	.03¼	.04¾
L-4*	lb.	.02¼	.03¼
Rexflex*	**lb.**	——	**.15**
Rosin Oil	gal.	.80	1.35
RR-10 (Neoprene)*	lb.	——	.37
R.S.O. Softening Oil*	**lb.**	**.03**	**.05**
RuBars*	lb.	.19¼	.20
Rubberol*	lb.	.18	.25¾
Santicizer B-16*	lb.	.48¾	.49¾
E-15*	lb.	.52¾	.53¾
M-17*	lb.	.44¾	.45¾
No. 140*	lb.	.32½	.36
No. 141*	lb.	.36	.37
No. 160*	lb.	.28½	.29½
No. 602*	lb.	——	.30½
No. 603*	lb.	——	.27
Sherolatum*	lb.	.03½	.06
Staflex DBES*	lb.	.58	.60½
DOS*	lb.	.58	.60½
IXA*	lb.	.32	.35
KA*	lb.	.36	.38¾
Stan Chlor Oils*	lb.	.13½	.20½
70*	lb.	.17½	.30
Stanolind Petrolatum*	lb.	.07	.156
Wax*	**lb.**	**.31**	**.33**
Sunny South Burgundy Pitch*	lb.	.1030	.1085
Rosin Oil*	gal.	.58	.76
Superla Wax*	lb.	.30	.397
Syncera Wax*	lb.	.16	.267
Syn Tac* (c.l.)	gal.	——	.33
Synthetic Revertant Oil	**lb.**	——	**.16**
Tar, Refined	**gal.**	**.1200**	**.1760**
Tarpine	lb.	.035	.050
Terpene A*	**gal.**	——	**.65**
Tetraflex R-122*	lb.	.27	.30½
TP-90B*	lb.	.59	.69
TP-95*	lb.	.65	.[illegible]
Transphalt Resins*	lb.	.03¾	.05¼
Tributyl Phosphate	lb.	.52½	.53½
Tricresyl Phosphate	lb.	.32½	.36
Turgum S*	lb.	.10¾	.11¾
Vanadiset B*	lb.	.036	.07
C*	lb.	.031	.06
MR 80 Mesh*	lb.	.08½	.12½
Vistac No. 1*	**gal.**	**1.00**	**1.21**
P*	lb.	.18	.18½
Vopcolene 50*	lb.	——	.31
Witcizer 100*	lb.	.20¼	.21¼
200*	lb.	.20¼	.21¼
201*	lb.	.22¾	.25¼
300*	lb.	.30	.33½
312*	lb.	.30½	.34
313*	lb.	.30½	.34
412*	lb.	.42½	.46
Witresin*	ton	——	52.50

PROCESSING AIDS

Castor Oil, Blown (dms.)	**lb.**	——	**.21**
Refined (dms.)	lb.	——	.18½
Castorwax*	**lb.**	——	**.24½**
Dutrex 7*	**lb.**	**.12**	**.20**
ELA*	**lb.**	——	**.82**
Hydrofol Glycerides 200*	lb.	.15½	.19¼
Kenflex N*	**lb.**	——	**.18**
Maleic Anhydride	lb.	——	.27
Millrex*	**lb.**	——	**.15**
Nadic Anhydride	lb.	——	.75
Polycin*	lb.	——	.24½
Resin No. 510*	lb.	.19	.26
No. 529*	lb.	.25	.32
Pulverized*	**lb.**	**.20½**	**.25**
Thiomalic Acid	lb.	——	3.50
Zyrox*	lb.	.78	.88

PROTECTIVE & STABILIZING AGENTS

Acacia*	**lb.**	**.12¾**	**.21**
Alcogum*	lb.	.08½	.24
Alpha Protein	**lb.**	——	**.23**
Arrowstoocrat*	lb.	——	.07½
Carob Bean Flour	lb.	——	.50
Casein	lb.	.32	.38
Emcol K-8300* (dms.)	lb.	.14	.18
Ethylene Diamine 68%	**lb.**	**.44**	**.47**
Gum Arabic	lb.	——	.23
Karaya Gum	lb.	——	.35
Locust Bean Gum	lb.	——	.50
Prosein*	**lb.**	——	**.06**
Stablex B*	**lb.**	**.50**	**.95**
K*	lb.	.27	.35

RECLAIMING AGENTS

Amalgamator Z-4*	lb.	.32	.33
Armeen C*	lb.	.46	.52
Mixed Crude*	lb.	.19	.25
T*	lb.	.32	.38
Burco RA*	lb.	.051	.081
BWH-1*	gal.	.17	.18
C-6 Oil* (28* & 32*)	gal.	.33	.38
C-10 Oil*	gal.	.25	.30
C-33* (t.c.)	gal.	——	.21½
C-42* (t.c.)	gal.	——	.23
Caustic Soda—Flake 76% (c.l., dms.)	cwt.	——	4.50
Liquid 50% (t.c.)	cwt.	——	2.80
Solid 76% (c.l., dms.)	cwt.	——	4.10
Cresylic Acid (99-100%)	gal.	.85	1.39
D-4* (t.c.)	gal.	——	.27
E-5* (t.c.)	gal.	——	.25
Flake Calcium Chloride (77-80%)	ton	——	29.00
G.B. Reclaiming Oil*	gal.	.19½	.21½
CD-10*	gal.	.17½	.19½
CD-50-U*	gal.	.25½	.27½
Gensol No. 6* (t.c.)	gal.	——	.40
Heavy Aromatic Naphtha	gal.	.13¼	.18½
LX-77 Reclaiming Solvent*	gal.	.21	.33
LX-572 Reclaiming Oil*	gal.	.27	.32
LX-777 Reclaiming Oil*	gal.	.23	.33
Neo-Fat D-242*	lb.	.05½	.07¾
42-70*	lb.	.08¼	.10¼
No. 517 H.B. Oil*	gal.	.11½	.16½
535*	gal.	.22	.27
Pitt-Consol "500" (dms.)	lb.	.30	.30½
PT 67 Light Pine Oil* (dms.)	gal.	——	.60
PT 101 Pine Tar Oil* (t.c., dms.)	gal.	.0460	.0634
PT 150 Pine Solvents* (dms.)	gal.	——	.44
Q Oil* (t.c.)	gal.	——	.286
Reclaiming Oil 3186-G*	gal.	.26	.33
Reclaiming Reagent No. 1431*	lb.	.21	.25
R.P.A. No. 3*	lb.	——	.47
RR-10*	lb.	——	.37
Soda Ash (c.l., bags)	cwt.	——	1.75
Solvent 534*	gal.	.20½	.26½
Solvent Oil 21*	gal.	.24	.29
C-42*	gal.	.23	.38
X-1 Resinous Oil*	lb.	.0225	.0325
701 Oil*	gal.	.27	.29

REINFORCING AGENTS—CARBON BLACK

Channel, Hard Processing (HPC) (bags)

Atlantic HPC-98*	lb.	.0775	.1450
Continental F*	lb.	.0775	.1450
Croflex*	lb.	.0775	.1450
Dixiedensed (and S)*	lb.	.0775	.1450
Kosmobile (and S)*	lb.	.0775	.1450
Micronex HPC*	lb.	.0775	.1450
Witco No. 6*	lb.	.0775	.1450

Channel, Medium Processing (MPC) (bags)

Arrow MPC*	lb.	.0775	.1350
Atlantic MPC-95*	lb.	.0775	.1450
Continental A*	lb.	.0775	.1450
Croflex TH*	lb.	.0775	.1450
Dixiedensed HR (and S-66)	lb.	.0775	.1450
Kosmobile HM (and S-66)	lb.	.0775	.1450
Micronex Standard*	lb.	.0775	.1450
Spheron 6*	lb.	.0775	.1450
Texas M*	lb.	.0775	.1450
Witco No. 1*	lb.	.0775	.1450

Channel, Easy Processing (EPC) (bags)

Atlantic EPC E-42*	lb.	.0775	.1450
Collocarb*	lb.	.0590	.1400
Continental AA*	lb.	.0775	.1450
Croflex 77*	lb.	.0775	.1450
Dixiedensed 77*	lb.	.0775	.1450
Kosmobile 77*	lb.	.0775	.1450
Micronex W-6*	lb.	.0775	.1450
Spheron 9*	lb.	.0775	.1450
Texas E*	lb.	.0775	.1450
Witco No. 12*	lb.	.0775	.1450
Wyex EPC*	lb.	.0775	.1350

Channel, Conductive (CC) (bags)

Continental R-40*	lb.	.2600	.3400
Dixie 5 Dustless*	lb.	.1350	.2100
Dixie Voltex*	lb.	.2600	.3400
Kosmink Dustless*	lb.	.1350	.2100
Kosmos Voltex*	lb.	.2600	.3400
Spheron C*	lb.	.1800	.2400
Voltex*	lb.	.2600	.3400

Channel, Surface Treated (STC) (bags)

Texas 109*	lb.	.0840	.1475

Conductive Furnace Black (CF) (bags)

Aromex CF*	lb.	.0875	.1450
Atlantic CF*	lb.	.0875	.1450
Continex CF*	lb.	.1050	.1550
Croflex CF*	lb.	.0875	.1450
Dixie CF*	lb.	.0875	.1450
Kosmos CF*	lb.	.0875	.1450
Shawinigan Acetylene Black*	lb.	——	.1900
Vulcan C*	lb.	.1100	.1750

REINFORCING AGENTS—CARBON BLACK (Cont'd)

Extra-Conductive Furnace Black (ECF) (bags)

Vulcan XC-72	lb.	.1775	.2700

Furnace, Fast Extruding (FEF) (bags)

Arovel FEF*	lb.	.0675	.1250
Continex FEF*	lb.	.0675	.1250
Croflex 50*	lb.	.0675	.1250
Dixie 50*	lb.	.0675	.1250
Kosmos 50*	lb.	.0675	.1250
Philblack A*	lb.	.0675	.1200
Statex M*	lb.	.0675	.1250
Sterling SO*	lb.	.0675	.1250

Furnace, Fine (FF) (bags)

Statex B*	lb.	.0725	.1300
Sterling 99*	lb.	.0725	.1300

Furnace, General Purpose (GPF) (bags)

Arogen GPF*	lb.	.0600	.1175
Dixie 35*	lb.	.0600	.1175
Kosmos 35*	lb.	.0600	.1175
Statex G*	lb.	.0600	.1175
Sterling V*	lb.	.0600	.1175
V (Non-Staining)	lb.	.0600	.1175

Furnace, High Abrasion (HAF) (bags)

Aromex HAF*	lb.	.0775	.1350
Continex HAF*	lb.	.0775	.1350
Croflex 60*	lb.	.0775	.1350
Dixie 60*	lb.	.0775	.1350
Kosmos 60*	lb.	.0775	.1350
Philblack O*	lb.	.0775	.1300
Statex R*	lb.	.0775	.1350
Vulcan 3*	lb.	.0775	.1350

Furnace, High Modulus (HMF) (bags)

Continex HMF*	lb.	.0675	.1200
Croflex 40*	lb.	.0675	.1250
Dixie 40*	lb.	.0675	.1250
Kosmos 40*	lb.	.0675	.1250
Modulex HMF*	lb.	.0625	.1200
Statex 93*	lb.	.0625	.1200
930*	lb.	.0675	.1200
Sterling L*	lb.	.0675	.1200
LL*	lb.	.0675	.1200

Furnace, Semi-Reinforcing (SRF) (bags)

Continex SRF*	lb.	.0575	.1150
Croflex 20*	lb.	.0575	.1150
Dixie 20*	lb.	.0575	.1150
Essex SRF*	lb.	.0575	.1150
Furnex*	lb.	.0575	.1150
Gastex*	lb.	.0525	.1200
Kosmos 20*	lb.	.0575	.1150
Pelletex*	lb.	.0525	.1100
NS*	lb.	.0525	.1100
Shawinigan Acetylene Black*	lb.	——	.1900
Sterling NS*	lb.	.0575	.1150
R*	lb.	.0625	.1250
S*	lb.	.0575	.1150

Furnace Super Abrasion (SAF) (bags)

Dixie 85	lb.	.1150	.1650
Kosmos 85	lb.	.1150	.1650
Philblack E*	lb.	.1150	.1550
Statex 160*	lb.	.1150	.1800
Vulcan 9*	lb.	.1150	.1800

Furnace, Super Abrasion, Intermediate (ISAF) (bags)

Aromex ISAF*	lb.	.0925	.1500
Continex ISAF*	lb.	.0925	.1500
Dixie 70*	lb.	.0925	.1500
Kosmos 70*	lb.	.0925	.1500
Philblack I*	lb.	.0925	.1450
Statex 125*	lb.	.0925	.1500
Vulcan 6*	lb.	.0925	.1500

Furnace, Super Conductive (SCF) (bags)

Vulcan SC*	lb.	.1800	.2450

Thermal, Fine (FT) (bags)

P-33 (c.l.)*	lb.	——	.0575
Sterling FT (c.l.)*	lb.	——	.0575

Thermal, Medium (MT) (bags)

Shellblack*(†)	lb.	——	.0250
Sterling MT (c.l.)*	lb.	——	.0400
MT Non-Staining (c.l.)*	lb.	——	.0500
Thermax (c.l.)*	lb.	——	.0400
Stainless (c.l.)	lb.	——	.0500

REINFORCING AGENTS—SILICA

Cab-O-Sil (compressed)*	lb.	.68	.75
Cab-O-Sil (uncompressed)*	lb.	.68	.75
D. C. Silica (pelletized)*	lb.	1.45	1.65
Hi-Sil 233*	lb.	.08	.09½
X303*	lb.	.40	.45
Santocel*	lb.	.62	.64
Valron Estersil*	lb.	2.00	2.25

REINFORCING AGENTS—MISCELLANEOUS

Angelo Shellac*	lb.	.50	.60
Darex Copolymer No. 3*	lb.	.47	.49
43G*	lb.	.39	.41
Darex Copolymer Latex No. 3-L	lb.	.41½	.46
Durez 12687 (and 12707)*	lb.	——	.38½
Durez 13355*	lb.	——	.30
Good-rite Resin 2007*	lb.	——	.41
Hystron*	lb.	.39	.41
Kralac A-EP*	lb.	.39	.41
Lampblack	lb.	——	.12
Marbon S and S-1*	lb.	.39	.41
8000*	lb.	.39	.41
Marmix*	lb.	.39	.41
Pliolite Latex 150*	lb.	.35	.39
Pliolite Resin-Rubber Masterbatches*	lb.	.33	.57
Pliolite NR*	lb.	.93	.95
S6B*	lb.	.36	.43
Plio-Tuf G85C*	lb.	.52	.54
Polyco 220*	lb.	.18¼	.19¼
Polypol S-70*	lb.	.22	.23

RETARDERS

Benzoic Acid TBAO-2*	lb.	——	.44
Dutch Boy Normasal*	lb.	——	.46
ESEN*	lb.	.35	.37
Good-rite Vultrol*	lb.	.62	.64
Harcopol 1183*	lb.	.70	.74
Retarder J*	lb.	.62	.64
PD*	lb.	.37	.39
W*	lb.	——	.42
Retardex*	lb.	.49	.49
Wiltrol P	lb.	.37	.39

RUBBER SUBSTITUTES

Mineral Rubber

Byerlyte*	ton	50.00	57.00
Hard Hydrocarbon (dms.)*	ton	53.00	55.00
Herron Flake*	ton	——	45.00
Mineral Rubber, Solid	ton	42.50	44.50
M. R. No. 38*	ton	55.00	65.00
Witresin	ton	——	52.50

Vulcanized Vegetable Oils

Amberex*	lb.	.29	.36
Brown	lb.	.15	.24
Car-Bel-Lite*	lb.	.3000	.3300
Neophax*	lb.	.17	.27
Polyrez A and C*	lb.	.12	.17
White	lb.	.15	.26

Miscellaneous Rubber Substitutes

G.B. Asphaltenes*	lb.	.06	.06½
Gilsowax B*	lb.	.09	.11
Resin No. 1098 (dms.)	lb.	——	.62
No. 1198*	lb.	.46¼	.49¾
Tysonite*	lb.	.26	.26¾

SOLVENTS

Acetone (dlvd.)	lb.	.11	.12
Amsco Lactol Spirits* (t.c.)	gal.	——	.19
Naphtholi Spirits*	gal.	——	.18
Mineral Spirits*	gal.	——	.17
Rubber Solvent* (t.c.)	gal.	——	.18
Solv A* (t.c.)	gal.	——	.24½
Solv A-80* (t.c.)	gal.	——	.30
Solv B* (t.c.)	gal.	——	.28½
Solv B-90* (t.c.)	gal.	——	.32
Solv D* (t.c.)	gal.	——	.30
Solv E*	gal.	——	.30
Solv F*	gal.	——	.30
Solv F-80*	gal.	——	.32½
Solv G*	gal.	——	.42½
Special Naphtholite* (t.c.)	gal.	——	.18
Special Textile Spirits*	gal.	——	.19
Super Hi-Flash Naphtha*	gal.	——	.35
Super Naphtholite*	gal.	——	.18
Textile Spirits* (t.c.)	gal.	——	.19
Amyl Chlorides, Mixed (t.c.l.) (dms.)	lb.	——	.11
Benzol 90%	gal.	.36	.40
Butyl Acetate (t.c.)	lb.	——	.13½
Butyl Alcohol (t.c.)	lb.	——	.13½
Secondary (dlvd.)	lb.	.15	.16
Tertiary (dlvd.)	lb.	.15	.16
Carbon Bisulfide, Tech.	lb.	.0545	.0161

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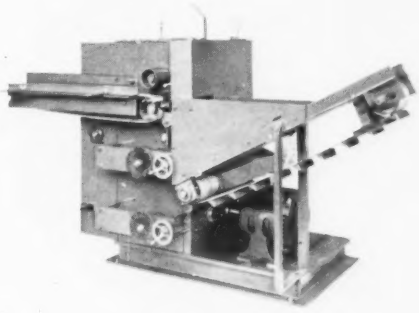

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SOLVENTS (Cont'd)

Carbon Tetrachloride	lb.	.10	.13½
Cosol 1*	gal.	.37	.43
2*	gal.	.42	.48
Cyclohexane	gal.	.55	.72
85% (c.l.) (dms.)	gal.	——	.30
Cyclohexanone	lb.	.29	.31½
Diacetone, Pure (dlvd.)	lb.	.15½	.16½
Dichlorethyl Ether (dms.)	lb.	.14½	.15
Formal (dms.)	lb.	.30¾	.31¼
Dichloropentanes (l.c.l.) (dms.)	lb.	——	.06
Dicom*	gal.	——	.50
Halowax Oil*	lb.	.28	.41
Heptanes* (t.c.)	gal.	.19	.22
Hexanes (t.c.)	gal.	.19	.22
Isopropyl Alcohol, Ref. 99% (dlvd.)	gal.	.57	.64
Ether, Ref. (dlvd.)	lb.	.09½	.10½
Mersol*	gal.	.43	.75
Mesityl Oxide (dlvd.)	lb.	.15	.16
Methyl Acetone, Syn. (dms., dlvd.)	gal.	.57	.63
Methyl Chloride	lb.	——	.11½
Methyl Ethyl Ketone	lb.	.15	.16
Methyl Isobutyl Ketone (dlvd.)	lb.	.17	.18
Methylene Chloride	lb.	.11¾	.16
N-5 Pentane Mix* (t.c.)	gal.	——	.13½
N-6 Hexanes* (t.c.)	gal.	——	.14½
N-7 Hexanes* (t.c.)	gal.	——	.13½
Penetrell*	gal.	.42	.63
Perchlorethylene	lb.	.11½	.14½
Petrolene* (t.c.)	gal.	——	.14125
Picolines, Alpha, Refined.	lb.	.43½	.44
Mixed	lb.	.32½	.33
Proprietary Solvent (dms.)	gal.	.66	.77
Propyl Acetate (t.c., dlvd.)	lb.	——	.11¾
Alcohol (t.c., dlvd.)	lb.	——	.11
PT 150 Pine Solvent* (dms.)	gal.	——	.44
Pyridine, Refined	lb.	.74½	.75
Quinoline	lb.	.50	.54¼
Rubber Solvent (t.c.)	gal.	——	.16
Rubsol (t.c.)	gal.	——	.12875
Skellysolve B (Hexanes)* (t.c.)	gal.	——	.158
C (Heptanes)* (t.c.)	gal.	——	.151
R (Rubber Solvent)*	gal.	——	1.29
Solvent, Crude, Light.	gal.	.19	.28
Solvesso 100* (t.c.)	gal.	.33	.35
150 (t.c.)	gal.	.33	——
Sunny South DD Dipentine*	gal.	.42	.63
Sunny South DD Pine Oil*	lb.	——	.15
Sunray*	gal.	.1140	.1600
Toluene (dms.)	gal.	——	.38
Toluol (t.c.)	gal.	.33	.35
Trichlorethane	lb.	.13	.13½
Triglycol Dichloride	lb.	.63	.64
Union Thinner 1* (t.c.)	gal.	——	.174
5* (dms.)	gal.	——	.199
7* (t.c.)	gal.	——	.164
2-50 W Hi-Flash*	gal.	——	.41
Xylol	gal.	.34	.38

STABILIZING AGENTS (for Vinyl Resins)

Advastab BC-12*	lb.	.90	.95
BC-74*	lb.	.70	.75
BC-105*	lb.	.75	.80
CH-101*	lb.	.60	.65
CH-201*	lb.	.60	.65
E-82*	lb.	.90	.95
ICX*	lb.	.62	.67
L Paste*	lb.	.65	.70
SN*	lb.	.47	.52
T-10*	lb.	1.90	1.95
T-50-LT*	lb.	3.20	3.25
XBZ-155*	lb.	.69	.74
XC-143*	lb.	.90	.95
XE-98*	lb.	.53	.58
Barca 10*	lb.	.75	.80
Barium Ricinoleate (BVS)	lb.	——	.70
Barium Stearate	lb.	.39	.44
Basic Silicate White Lead	lb.	.16	.17
Cadmium Ricinoleate	lb.	——	2.00
Calcium Ricinoleate	lb.	——	.55
Dutch Boy DS-207*	lb.	——	.54
Plumb-O-Sil A*	lb.	——	.29¾
B*	lb.	——	.31¼
Tribase*	lb.	——	.26½
Dythal*	lb.	——	.39½
Ferro 182* (dms.)	lb.	.70	.76
200* (dms.)	lb.	1.33	1.43
203* (dms.)	lb.	.87	.91
541* (dms.)	lb.	.35½	.45½
541A* (dms.)	lb.	.82	.86
700* (dms.)	lb.	.48¾	.58¾
900* (dms.)	lb.	.90	.94
903* (dms.)	lb.	.60	.64
909* (dms.)	lb.	.91	.95
920*	lb.	——	.98
931* (dms.)	lb.	.75¾	.85¾
993* (dms.)	lb.	.89	.99
1203* (dms.)	lb.	1.30	1.40
1206* (dms.)	lb.	1.32	1.36
1820* (dms.)	lb.	.90	.94
1825* (dms.)	lb.	1.00	1.04
1976*	lb.	.47	.51

STABILIZING AGENTS (Cont'd)

Harshaw 1-V-3*	lb.	.43	.45
1-V-4*	lb.	.66½	.70
1-V-7*	lb.	.66	.68
2-V-4*	lb.	.85	.87
2-V-7*	lb.	——	1.10
2-V-8*	lb.	——	1.30
5-V-1*	lb.	.41	.43
7-V-1*	lb.	——	.90
8-V-1*	lb.	.88	.90
8-V-5*	lb.	——	.80
8-V-100*	lb.	.82	.84
9-V-1*	lb.	.70	.72
12-V-5*	lb.	.73	.75
24-V-1*	lb.	1.10	1.12
28-V-2*	lb.	——	1.18
128-V-5*	lb.	.86	.88
Lithium Stearate	lb.	.52	.57
Fluffy	lb.	.47½	.70
Standard	lb.	.52½	.75
Mark C*	lb.	.88	.90
E*	lb.	.72	.75
M*	lb.	.68	.70
PL*	lb.	.63	.65
TT*	lb.	.72	.75
WS*	lb.	.98	1.00
X*	lb.	2.50	2.75
XI*	lb.	.87	.90
XV*	lb.	.88	.90
XX*	lb.	.58	.60
Metasap 613-A*	lb.	——	.69
613-B*	lb.	——	.84
613-C*	lb.	——	1.06
621*	lb.	——	.88
624*	lb.	——	.75
633*	lb.	——	.75
635*	lb.	——	.45
Modicol N*	lb.	.41½	.42½
S*	lb.	.30⅓	.31⅓
Sodium Silicates 41°/1:32	cwt.	1.00	2.10
Stabelan E*	lb.	1.35	1.50
XL*	lb.	.55	.65
HR-50*	lb.	.75	.90
HR Liquid*	lb.	.65	.75
HR Paste*	lb.	.85	.95
HR Powder*	lb.	.95	1.05
No. 110 Liquid	lb.	.65	.75
No. 115 Liquid	lb.	.85	.95
No. 120 Liquid	lb.	.65	.75
Stabilizer No. 52*	lb.	1.90	2.00
89X*	lb.	.75	.80
B-5*	lb.	——	.70
E6B*	lb.	——	.95
G-1*	lb.	1.25	1.40
HR*	lb.	.85	.89
L*	lb.	——	.60
OM-10*	lb.	——	1.95
Staflex OY*	lb.	1.00	1.20
QXMA*	lb.	——	.70
Stayrite 10*	lb.	.34	.36
P-10*	lb.	.41	.43
15*	lb.	.53	.58
20*	lb.	.37	.42
22*	lb.	1.00	1.13
25*	lb.	.35	.40
70*	lb.	.68	.70
71*	lb.	.88	.90
75*	lb.	.59	.62
76*	lb.	.53	.55
80*	lb.	.68	.70
90*	lb.	.68	.70
95*	lb.	.68	.70
229*	lb.	.45	.50
Vanstay C-73*	lb.	.63	.65
HT*	lb.	.87	.90
L*	lb.	.32	.35
N*	lb.	.98	1.00
R*	lb.	.67	.70
S*	lb.	.57	.60
Z*	lb.	.62	.65

STIFFENING AGENTS

Polyac*	lb.	——	1.80
Processing Stiffener 710*	lb.	——	.88
Solvitose HDF, H. C-S, T. and E*	lb.	.22	.25
Versatil Gum 8-E*	lb.	.15	.19

SUN CHECKING AGENTS

Allied AA-1144*	lb.	.23	.24
AA-1177*	lb.	.15½	.16½
Antisol*	lb.	——	.23
Antisun* (Chipped)	lb.	.15½	.17½
(Slabbed)	lb.	.15	.17
Heliozone*	lb.	.31	.32
Microflake*	lb.	.20	.24
Nacconol NRSF*	lb.	.40½	.45
NBC*	lb.	——	1.55
Ross Sunproofing Waxes*	lb.	——	.14½
Sunolite*	lb.	.16	.22
127*	lb.	.16½	.20½
154*	lb.	.23	.25
Sunproof*	lb.	.31	.32
713*	lb.	.25	.26
Improved*	lb.	.25	.26
Super*	lb.	.40	.41
Jr.*	lb.	.20	.21
Tonox*	lb.	.52	.54

SURFACE ACTIVE AGENTS

Anhydrapent*	lb.	.56	.59
Anhydrol 6990*	lb.	.51	.56
6991*	lb.	.51	.56
Aquarex D*	lb.	——	.78
G*	lb.	——	.21
MDL*	lb.	——	.33
ME*	lb.	——	.80
NS*	lb.	——	.60
SMO*	lb.	——	.50
WAQ*	lb.	——	.22
Emulphor EL-620*	lb.	——	.40
EL-719*	lb.	——	.58
ON-870*	lb.	——	.55
Igepal CA-630	lb.	——	.29
CO-630	lb.	——	.29
CO-730	lb.	——	.29
CO-850*	lb.	——	.29
CO-880*	lb.	——	.29
Igepon CN-42*	lb.	——	.25
T-33*	lb.	——	.21
T-51*	lb.	——	.13½
T-77*	lb.	——	.49
Kessco 50201*	lb.	——	.43½
50203*	lb.	——	.46
18201*	lb.	——	.36½
18203*	lb.	——	.36
Pluronic L62*	lb.	.33½	.39
L64*	lb.	.33½	.39
Sellogen Gel*	lb.	——	.12¾
Soybean Lecithin	lb.	.13	.17

TACKIFIERS

Amalgamator Z-4*	lb.	.32	.33
Arcco 620-32B*	lb.	.20½	.21½
716-30*	lb.	.18½	.19½
1041-21*	lb.	.16½	.17½
A-26*	lb.	.18	.19
Bunaweld Polymer No. 780*	lb.	——	.24
No. 5514*	lb.	——	.35
Galex* (dms.)	lb.	.17¾	.18¾
Indopol H-300*	gal.	1.00	1.22
Koresin*	lb.	——	.95
Liquid Rubber Flux*	lb.	——	.14
Nacconal NRSF* (dlvd.)	lb.	.40½	.45
Nilox Resin* (c.l.)	cwt.	——	14.50
Resin V	lb.	——	.23½
Synthol*	lb.	.17	.24¾
Vistac A*	lb.	.21½	.22¼
Vistanex LM Grades*	lb.	——	.45
Zirex* (c.l.)	cwt.	——	14.75

THICKENERS (For Latex)

Alcogum AN-6*	lb.	——	.05
AN-10*	lb.	——	.08½
PA-10*	lb.	——	.12
Betanol* (dms.)	lb.	.70	.95
Gomme Labolene*	lb.	.45	.47
Good-rite K-702*	lb.	.34½	.35
K-704*	lb.	.21	.22
K-705*	lb.	.31	.32
K-707*	lb.	.18	.19
K-708*	lb.	.29	.30
K-710*	lb.	.15	.16
Modicol VD*	lb.	.13⅓	.14⅓
VE*	lb.	.13⅓	.14⅓
Polyco 296 BT*	lb.	.15	.16
296-N*	lb.	.15	.16
530*	lb.	.15	.16
Propylene Laurate (dms.)	lb.	.57	.82
Sodium Silicate, 41°/1:3.2	cwt.	1.10	2.20
Solvitose Series*	lb.	.22	.25

VULCANIZING AGENTS

Selenium

Vandex*	lb.	——	7.50

Sulfur

Aero Brand* (c.l.)	cwt.	——	2.65
Blackbird* (c.l.)	cwt.	——	2.85
Cloud* (c.l.)	cwt.	——	2.80
Crystex*	lb.	.19½	.23
Darex Dispersed Sulfur*	lb.	.14	.16
Devil A* (c.l.)	cwt.	——	2.40
Dispersed Sulfur	lb.	.14	.16
Insoluble Sulfur 60*	lb.	.12½	.13
Ko-Blend IS*	lb.	——	.39
Mist* (Wettable) (c.l.)	cwt.	——	4.00
Spider* (c.l.)	cwt.	——	2.80
Star* (c.l.)	cwt.	——	3.25
Sulfasan R*	lb.	1.55	1.57
Tire* (c.l.)	cwt.	——	2.40
Tube* (c.l.)	cwt.	——	3.25
Vultac 2*	lb.	.47	.49
3*	lb.	.51	.53

Tellurium

Telloy*	lb.	——	2.75

WETTING AGENTS

Advawet No. 10*	lb.	——	.17
No. 33*	lb.	——	.48
Aerosol 18*	lb.	——	.40
AY*	lb.	1.00	1.20
MA 80%*	lb.	.67	.72
OS*	lb.	.39	.45
OT 75% Aqueous*	lb.	.63	.68
OT 100%*	lb.	1.00	1.20
OT-B*	lb.	.85	1.05
Alrosal* (dms.)	lb.	——	.40
Alrosperse*	lb.	——	.18
Anhydrol 6990* and 6991*	lb.	.51	.56

WETTING AGENTS (Cont'd)

Areskap 50*	lb.	.30	.32
Dry 100*	lb.	.60	.64
Aresket Dry 300*	lb.	.60	.64
Aresklene 375*	lb.	.42	.47
Armacs*	lb.	.28	.77
Arquads*	lb.	.42	.61
Emcol 5100* (dms.)	lb.	—	.31
Energetic W-100	lb.	.28½	.35
Etho-Chemicals*	lb.	.26	.58
Ethomeen S/15*	lb.	.48	.50
T/15*	lb.	.46	.48
Kesco E-122* (dms)	lb.	—	.45
18201*	lb.	—	.38½
Kreelon 4D* (dms.)	lb.	.13	.16
8G* (dms.)	lb.	.26	.28
Kyro EO* (dms.)	lb.	—	.29¾
Modicol N*	lb.	.41½	.42½
S*	lb.	.30⅜	.31⅜
Nacconol SL* (dlvd.)	lb.	.084	.10
60S* (dlvd.)	lb.	.19	.225
Nacconol A* (dlvd.)	lb.	—	.52
Nekal WS-25	lb.	—	.38
WS-99	lb.	—	.95
Orvus AB Granules*	lb.	.15¾	.16¾
Parnol*	lb.	.13	.18
Regal Beads	lb.	.12¾	.16¾
H. D. Beads	lb.	.12¾	.15¾
Santomerse No. 3	lb.	.41	.45
S*	lb.	1.55	1.85
Selapon Gel*	lb.	—	.13
Sorapon SF-73*	lb.	—	.18
SF-78*	lb.	—	.30
Sorbit P*	lb.	—	.28
Soybean Lecithin	lb.	.13	.17
Stablex G*	lb.	.50	.90
Tergitol 4* (dms., dlvd.)	lb.	.32	.33
7* (dms., dlvd.)	lb.	.43	.44
O8* (dms., dlvd.)	lb.	.31	.32
P28* (dms., dlvd.)	lb.	.18½	.19
Trenamine W-30	lb.	—	.15
Vultamol*	lb.	—	.17½
Wetsit Conc.*	lb.	.25	.28

MISCELLANEOUS CHEMICALS

Aquesperse 30*	lb.	—	.11
Arecopel W-18*	lb.	.17	.19
Ashury Graphite*	lb.	.05	1.45
Copper Inhibitor X-872-L*	lb.	—	2.01
D-Tac*	lb.	—	.22
2-Ethyl Hexanol	lb.	.23¾	.24¾
Fura-Tone Resin 1226*	lb.	.41	.43
MODX*	lb.	.32½	.34½
Nacconates* (dms.)	lb.	.99	3.53
Para Resine*	lb.	.04	.04½
Pigmented Filmite* (dlvd.)	lb.	.16¾	—
Resorcin, Tech.	lb.	.77½	.81½
Rio Resin*	lb.	.70	.72
Rongalite CX*	lb.	—	.21½
Sherosopes*	lb.	.13½	.18¾
Sublac Resin PX-5*	lb.	.23½	.24½
Synpep*	lb.	.54	.60
Thiokol LP-2*	lb.	—	.96
LP-3, LP-32, LP-33*	lb.	—	.96
LP-8*	lb.	1.25	1.35
Tysonite*	lb.	.26	.26¾
VA-7*	lb.	—	.50
Vanfre*	gal.	2.45	3.00
No. 3* & No. 4*	gal.	1.95	2.00

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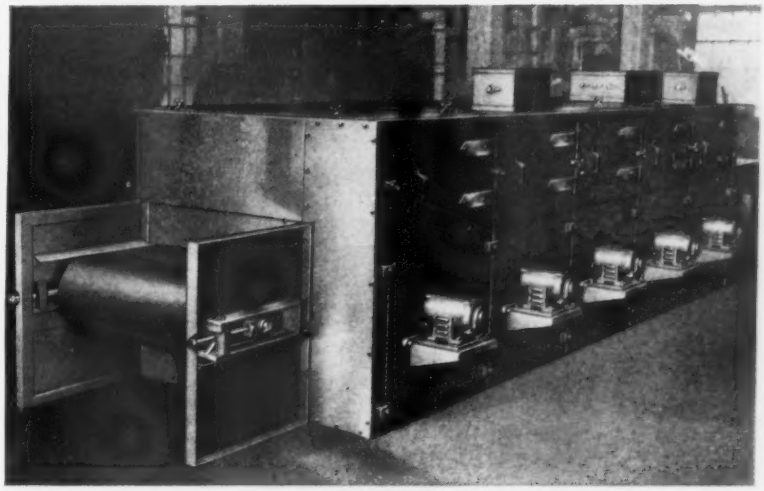

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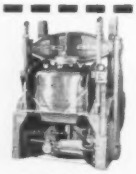
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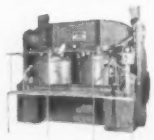
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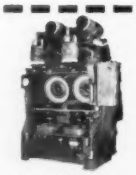
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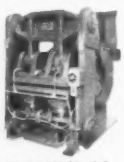
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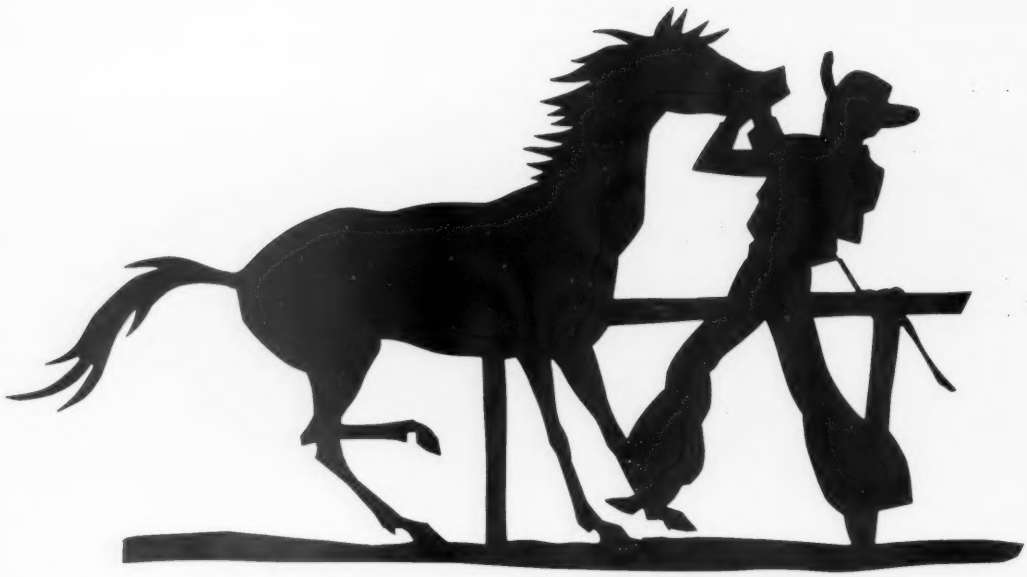

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